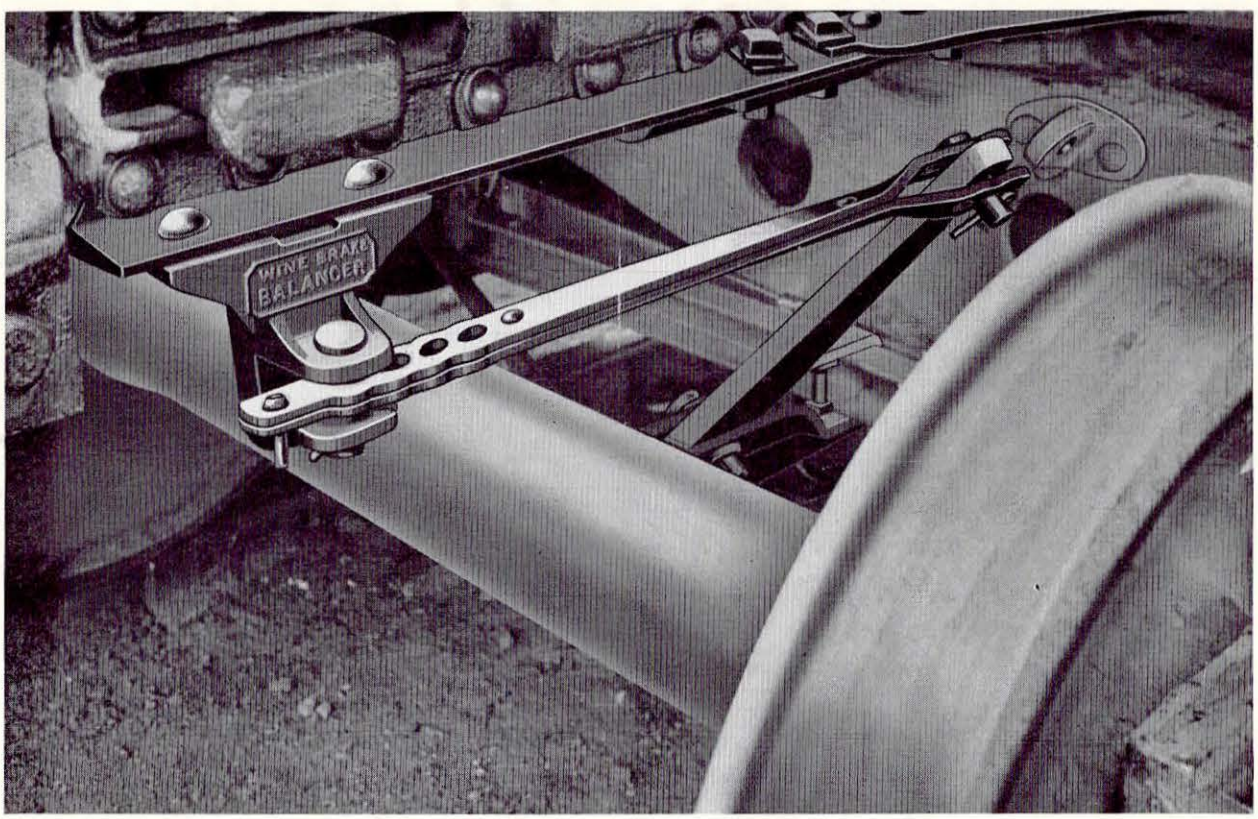
SEPTEMBER 19, 1936

Railway Age

Founded in 1856

REDUCE TRUCK MAINTENANCE

LIBRARY
COLLEGE



EQUALIZE BRAKE FORCES

WITH

THE WINE BRAKE BALANCER

THE WINE RAILWAY APPLIANCE CO. TOLEDO, OHIO.

OKONITE

The best product possible

OKONITE insulation with an unsurpassed record since 1878 is still generally recognized as the acme of perfection for rubber insulations and as "the best product possible" of its type.

The Okonite Company and its affiliates, however, have constantly kept step with the advances of the electric art by research and continually increasing manufacturing facilities to fully meet the new wire and cable problems as they have arisen.

In all cases, whether the correct solution calls for rubber, impregnated paper, varnished cambric, asbestos, glass or the newer synthetic compounds, the policy still is and will continue to be

"The best product possible"

THE OKONITE COMPANY
Founded 1878
and
HAZARD INSULATED WIRE WORKS DIVISION

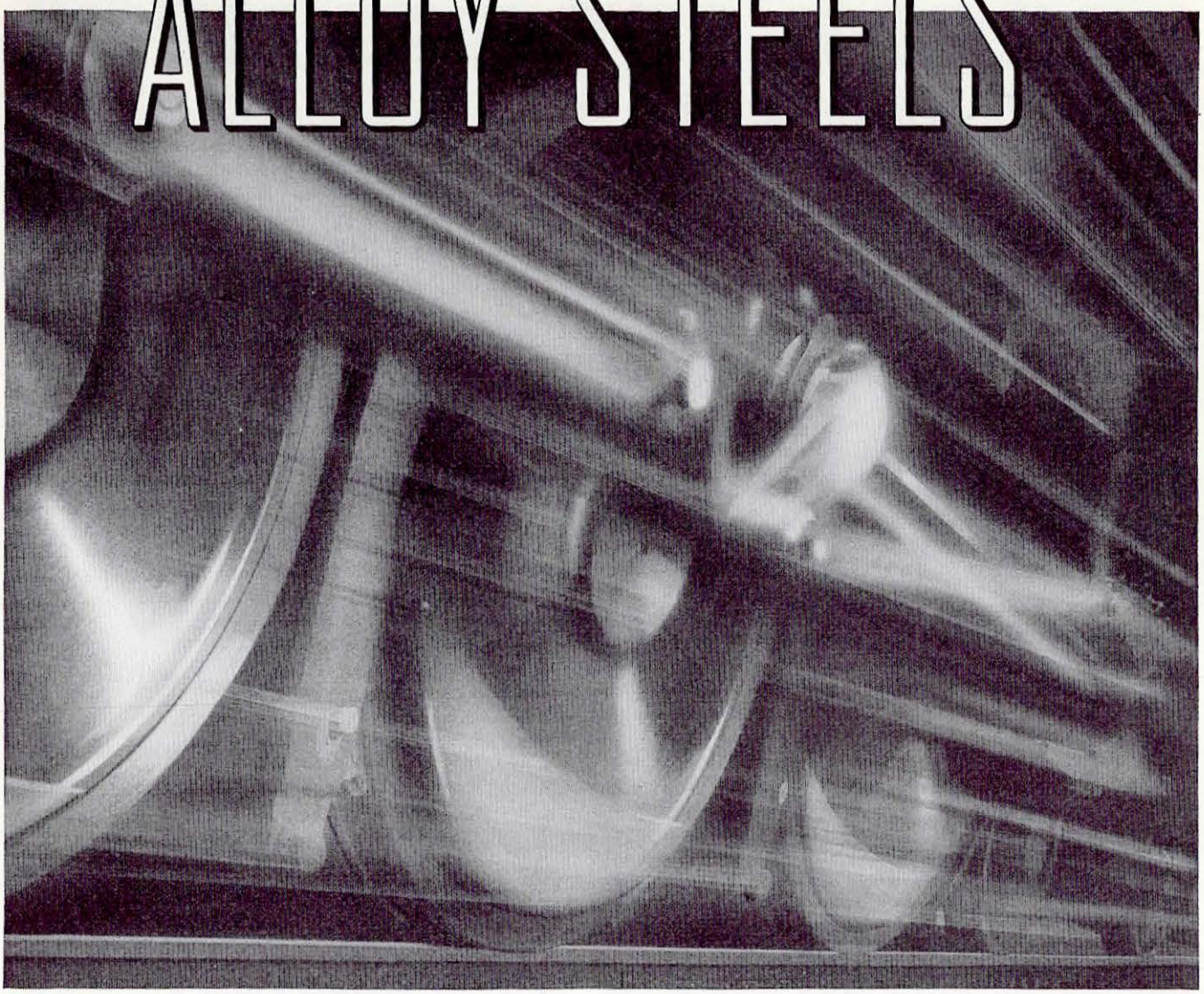
THE OKONITE-CALLENDER CABLE COMPANY, INC.
EXECUTIVE OFFICE: PASSAIC, N. J.

New York, Philadelphia, Los Angeles, Boston, Pittsburgh, Seattle, Buffalo, Chicago, Washington, Dallas, Detroit, San Francisco, Atlanta

Factories: Passaic, N. J. Wilkes-Barre, Pa. Paterson, N. J.

Published weekly by Simmons-Boardman Publishing Company, 1309 Noble Street, Philadelphia, Pa. Entered as second class matter January 4, 1933, at the Post Office at Philadelphia, Pa., under the Act of March 3, 1879.

ALLOY STEELS



to shear off weight where the reduction counts most

A TON of weight saved by shaving some off here and there on a 200-ton locomotive may not count for much. But a ton saved by changing rods to stronger, lighter alloy steel—2000 pounds that would have to be counterbalanced by hundreds of pounds more, that would be started and stopped ten times each second, means an enormous saving. Stresses and strains in the entire frame go down. The power used in thrashing that weight around is saved. Pounding and hammering on rails and roadbed are considerably lessened.

Bethlehem makes an alloy steel suitable for each of the numerous tasks where these materials are of use in conditioning motive power for today's service. Bethlehem's experience with alloy steels in its own forging shops is very valuable in the production of billets for your shops. Let our metallurgists work with you in determining the best material for your needs.

Special Bethlehem Alloy Steels for locomotives

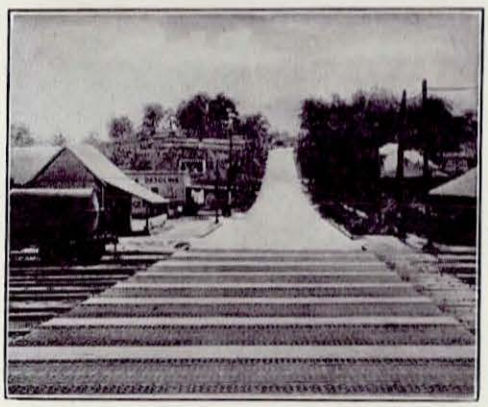
Bethlehem makes a number of special alloy steels for certain highly-stressed locomotive parts. Prominent among these are Mayari Engine-bolt Steel, Mayari Staybolt Steel, Silico-Manganese Spring Steel and Mayari Superheater-Bolt Steel.

BETHLEHEM STEEL COMPANY

BETHLEHEM STEEL

RACOR SPECIALTIES

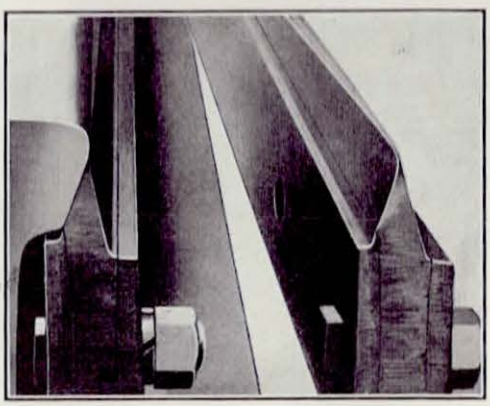
RACOR
THE CROSSING THAT WON'T WEAR OUT



• This crossing tends to prevent accidents and promotes the good will of the public. In addition to giving an even, non-skid surface, it wears practically forever. It may be removed to permit track maintenance and replaced while ordinary crossings must be torn up and new ones relaid. It pays for itself in a very short time.

RAMAPO-AJAX

RACOR
SAMSON SWITCH POINT



• Racor Samson Switch Points mean long life with no more broken down switch points and no need for switch point protectors. This is done by the inverted "V" of the point which permits it to fit snugly against the undercut stock rail. It will wear smoothly and not break down. Wheel flanges pass smoothly over Racor Samson Switch Points. They cost but little more and give added safety.

RAMAPO-AJAX

RACOR

RACOR WORKS

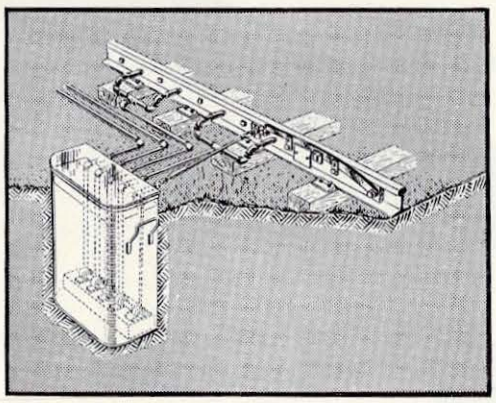
Hillburn, New York
Niagara Falls, New York
Chicago, Ill.

East St. Louis, Ill.
Superior, Wis.
Pueblo, Col.

Seattle, Wash.
Los Angeles, Cal.
Niagara Falls, Ont.

ARE MONEY SAVERS

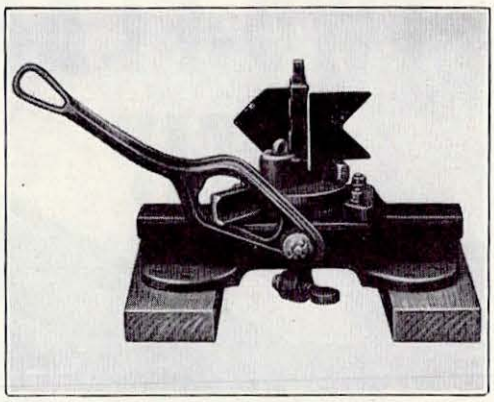
RACOR
RAIL LUBRICATOR



• This lubricator greases tracks for a distance of 10 miles from the lubricator itself. The wheels of passing trains activate the mechanism and spread the grease. The operating parts and connections are flexible and require only periodic inspection to keep the reservoir filled and the few exposed parts oiled. Extensive tests over a long period prove that the money saved on rail and wheel purchases pays for the lubricator in a comparatively short time. It is a real investment.

RAMAPO-AJAX

RACOR
AUTOMATIC SWITCH STAND NO. 20-B



• The average life of an automatic stand is more than double that of a rigid stand.

The No. 20-B with its newly designed lever provided with an apron to protect its working parts from the entrance of dust and snow is safer and surer in operation. This protection adds still more to the life of the stand.

Automatic stands are replaced only when worn out. They are not broken or damaged by runaway cars.

RAMAPO-AJAX

RACOR

GENERAL OFFICES
230 PARK AVENUE, NEW YORK

DOUBLE

the Heating and Welding capacity of your AIRCO-DB Welding Torch with the AIRCO-DB

TWO-FLAME TIP

Two torches in one—that's what it amounts to when you screw this TWO-FLAME TIP to the handle of the regular AIRCO-DB Welding Torch. By providing double the amount of heat, the temperatures required in building up rail ends and in heat treating, are reached much faster and with less dissipation of heat through the rail. Obviously this means a saving of gases and material as well as time. Use the AIRCO-DB TWO-FLAME TIP and cut the cost of your rail end welding and heat treating. WRITE for details.

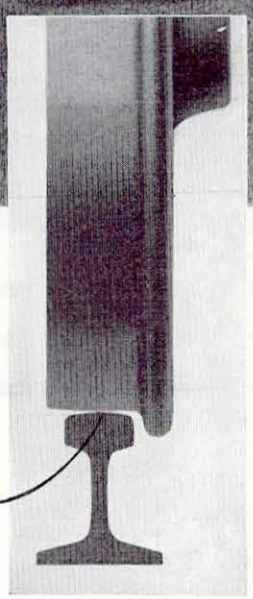
AIR REDUCTION

SALES COMPANY

General Offices: 60 E. 42nd St., New York, N.Y.

DISTRICT OFFICES in PRINCIPAL CITIES

the limited rides a Chalkline



ON eighty or a hundred pairs of spinning wheels, the Limited speeds across the country. Swinging around curves at 60 miles an hour; plowing through frogs, over switch points; clacking over tempered-steel crossings. Hitting 70, 80, 90 on straightaways—with the hammering "ping" of rail joints striking three times each second. Then scorching under the relentless 15-ton grip of brake shoes on slow-downs and stops.

With all this speeding, swerving, hammering, there is only a chalkline of contact between wheel and rail. More would increase friction, cut down speed, and make today's schedules impossible to meet. For 100,000 miles and longer wheels must take this beating—steel against hard steel—and not lose the contour of the rim, not wear enough to widen that chalkline of contact.

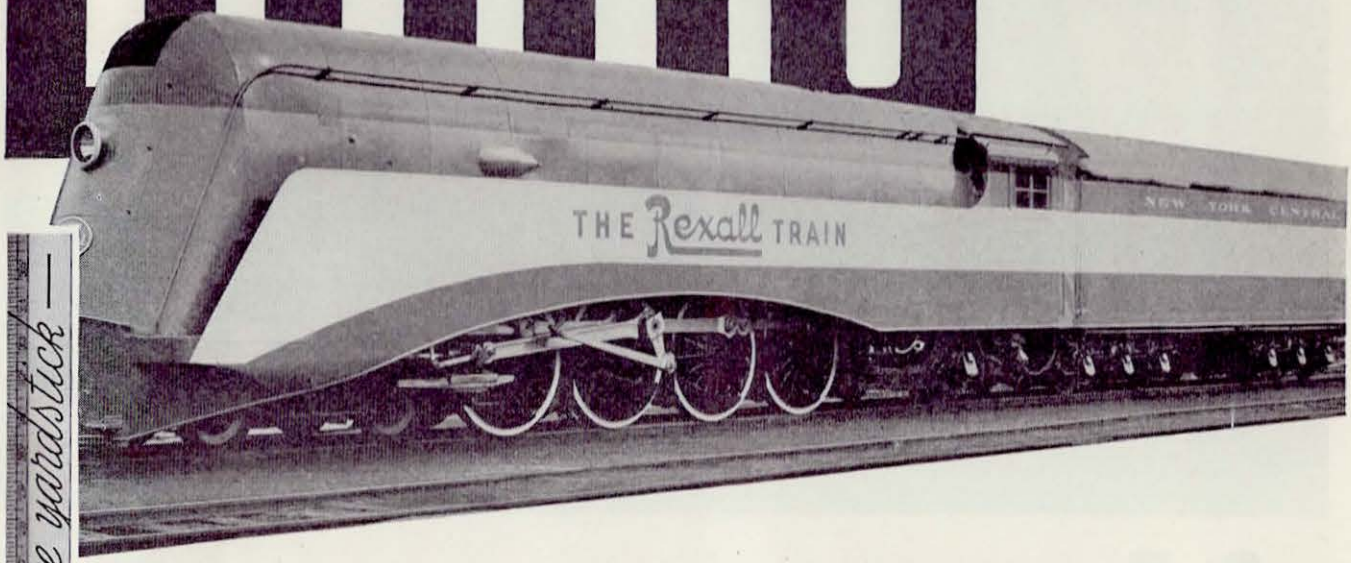
It takes real wheels to stand up under the severe punishment of today's new schedules. Bethlehem builds them—forged-and-rolled steel wheels, heat-hardened if you wish, that will roll up hundreds of thousands of satisfactory miles. Low maintenance is engineered into their design. Equip the cars on your toughest run with Bethlehem Heat-Treated Wrought-Steel Wheels; check the records of wheel wear—and see for yourself the savings that Bethlehem Wrought-Steel Wheels bring.

BETHLEHEM STEEL COMPANY, *General Offices:* Bethlehem, Pa. *District Offices:* Albany, Atlanta, Baltimore, Boston, Bridgeport, Buffalo, Chicago, Cincinnati, Cleveland, Dallas, Detroit, Hartford, Honolulu, Houston, Indianapolis, Kansas City, Los Angeles, Milwaukee, New York, Philadelphia, Pittsburgh, Portland, Ore., Salt Lake City, San Antonio, San Francisco, St. Louis, St. Paul, Seattle, Syracuse, Washington, Wilkes-Barre, York. *Export Distributor:* Bethlehem Steel Export Corporation, New York.

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY

DUCO—



SELECTED FOR SPECIAL JOB

THE New York Central provided a streamlined, oil-burning locomotive to haul the United Drug Company's "million dollar" merchandising train on its 25,000-mile circuit. The locomotive had to be painted and the colors had to match the familiar Rexall blue and white. It was necessary to use paint that would retain its good appearance. Time was too short for the brush application of slow-drying paint and varnish materials.

DUCO was the logical choice for two reasons: first, the New York Central has had years of experience with the performance of DUCO on its own locomotives; and second, because it solved the problem on every count. The color match was perfect. Spray application and fast drying finished the job on time. The DUCO film dries to such a high gloss that there is no need of a clear coat.

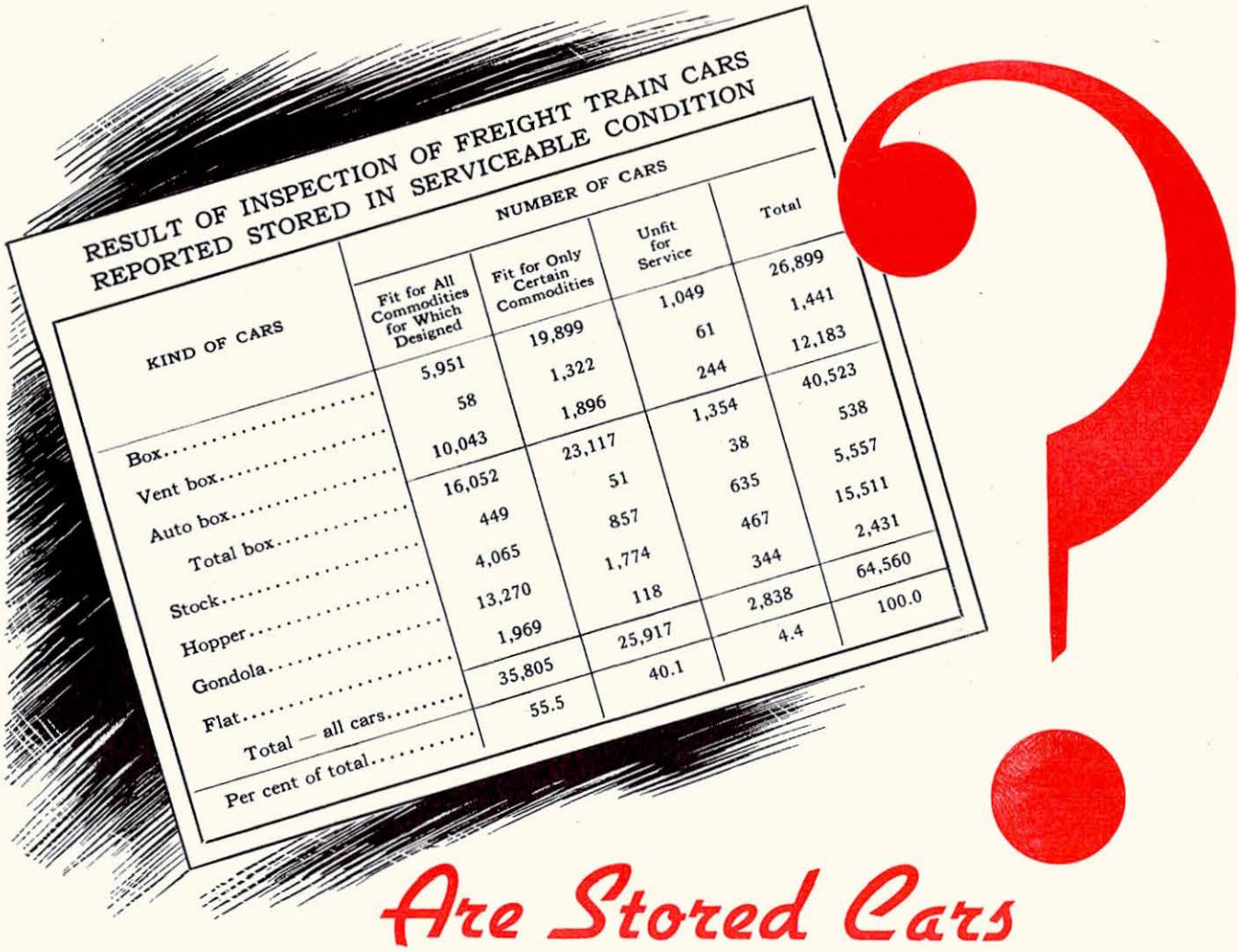
Quick application, fast drying, and fewer operations are bound to mean substantial savings on the cost of materials and labor. Most important of DUCO'S economy features is *durability*. The DUCO film is tough and dries quickly to a hard film, giving complete protection and good appearance much longer than orthodox paint. DUCO has made it possible for some railroads to lengthen shopping schedules to four years before even slight repairs are needed. The result is that equipment stays in revenue service for the longest possible time without interruption.

Ask our representative to show you how DUCO and DULUX can lower your finishing costs. E. I. du Pont de Nemours & Co., Inc., Finishes Division, Wilmington, Delaware.

MEASURE YOUR PAINT COST BY THE *performance yardstick*—

DU PONT
REG. U. S. PAT. OFF.

RAILWAY FINISHES


RESULT OF INSPECTION OF FREIGHT TRAIN CARS
REPORTED STORED IN SERVICEABLE CONDITION
NUMBER OF CARS
KIND OF CARS
Fit for All Commodities for Which Designed
Fit for Only Certain Commodities
Unfit for Service
Total
Box 5,951 19,899 1,049 26,899
Vent box 58 1,322 61 1,441
Auto box 10,043 1,896 244 12,183
Total box 16,052 23,117 1,354 40,523
Stock 449 51 38 538
Hopper 4,065 857 635 5,557
Gondola 13,270 1,774 467 15,511
Flat 1,969 118 344 2,431
Total — all cars 35,805 25,917 2,838 64,560
Per cent of total 55.5 40.1 4.4 100.0

Are Stored Cars Ready to Run

COVERDALE & COLPITTS, Consulting Engineers, included the accompanying exhibit and statements in their report on the "Economic Aspects of the Freight Car Situation."

"In a study made by the Federal Coordinator released January 4, 1934 (See Exhibit B), it was found that 44.5 per cent of the cars reported by the railroads as stored and in serviceable condition were either unfit for service or were not fit for the service intended. If such conditions prevail generally on Class 1 Railroads, a car shortage might occur before average weekly loadings reached 750,000 cars.

"Our calculations of serviceable car requirements are based on the performance for the year 1929. Since that year there has been a material increase in average speed of freight trains; also, arrangements have been made for averaging per diem on box cars and, in some instances, for the pooling of less carload merchandise. These factors are expected to improve the car supply situation, although the averaging of per diem on box cars has not been in effect a sufficient length of time to justify a conclusion as to its effectiveness. The pooling of less carload merchandise may be considered as more or less experimental. It should also be noted that the matter of freight car pooling has many proponents, although nothing definite has been done in this matter. On the other hand, the further deterioration of the large number of old cars still included under the caption "Serviceable Cars" will serve to hasten the date of the shortage."

American Railway Car Institute

19 Rector Street New York, N. Y.

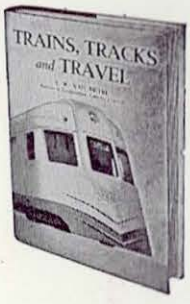
Valuable Books for Your Library

New Fourth Edition

Trains, Tracks and Travel

By T. W. VAN METRE

Professor of Transportation, Columbia University



The new edition of this popular book on railroads describes latest practice. There is a complete new chapter on streamlined trains and additions to others covering the new developments in air brakes, air conditioning of passenger cars and in high-speed Diesel and electric locomotives. Among the numerous new illustrations are shown the new streamlined trains. This is an excellent book for a boy who wants to know more about railroads and for the average reader.

Contents

Our Steam Railroads—The Railroad Track—The Steam Locomotive—Electric Locomotives; Gasoline and Oil Motors—Freight Cars—Passenger Train Cars—Tomorrow's Trains Become Today's—Passenger Stations and Terminals—The Operation of Trains.

1936. 4th. 312 pages, 276 illus., 7 x 9½ in., cloth, $3.00

Analysis of Railroad Operations

By J. L. WHITE

Formerly Assistant Comptroller, United States Railroad Administration; Director, Section of Transportation Service—Federal Co-ordinator of Transportation

Without going into the details of accounting procedure, Mr. White clearly explains the accepted method of analyzing and interpreting railroad statistical data. He describes how the figures produced in accounting departments should be used in the study of railroad operating results; how these figures reflect the various activities of the railroad and its efficient or inefficient operation as a whole or in any of its departments.

Classifications of the Interstate Commerce Commission are shown in full and frequent references are made to them in the main text.

1925. 391 pages, forms, index, work sheet, and the Jan. 1, 1935, order of the I. C. C., 6 x 9 inches, cloth. $4.00

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Please send prepaid for ten days' free examination the books checked below. If satisfactory I will remit the list price. Otherwise I will return the books without obligation.

( ) Trains, Tracks and Travel
( ) Analysis of Railroad Operations
( ) Who's Who in Railroading
( ) United States Safety Appliances
( ) When Railroads Were New
( ) Transportation Glossary

Name .....

Address .....

City .....

State .....

Company .....

Position .....

(This offer is limited to the United States and Canada) R.A. 9-19-36

United States Safety Appliances

(A. A. R. Edition)

The 14th edition of this book contains all the new laws, I. C. C. rulings and A. A. R. specifications since the last edition in 1928. More than 250,000 of these books have been sold.

1935. 121 pages, 49 drawings, 7½ x 3¾, imitation leather, $1.00

When Railroads Were New

By CHARLES FREDERICK CARTER

A fascinating human interest story of the early American and Canadian railroads and of the men who built and ran them. The author, an old railroad man, tells of the beginnings of the Erie, the Pennsylvania, the Baltimore and Ohio, the New York Central, the first Pacific railroad, the Santa Fe, the Rio Grande, the Canadian Pacific and other lines. It is illustrated with reproduction of wood cuts of early locomotives and railroad scenes.

1926. 4th (Centenary). 338 pages, 17 illustrations, 6 x 9 inches, cloth. $2.50

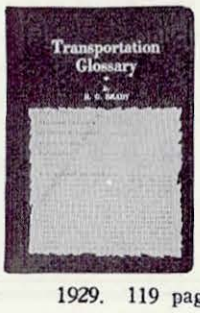
Who's Who in Railroading

The 9th Edition of what was formerly the "Biographical Directory of Railway Officials of America" is based upon a complete resurvey of the field by means of original questionnaires. Biographical sketches of some 4,000 railroad officials, equipment manufacturers, economists, members of regulatory commissions and others whose work is directly connected with the railroad industry of North America are presented. The descriptions of these leaders of the rail industry include personal information, such as their family connections and social, religious and political affiliations, as well as a complete outline of their professional careers.

1930. 579 pages, 6 x 9 x 1⅝ inches, cloth. $3.00

Transportation Glossary

By H. G. BRADY



Technical and semi-technical terms, phrases and expressions in more common use in railway, highway, air and marine transportation, and in port traffic are concisely defined in this handy reference book. Ordinary dictionaries, thesauri and law book sources furnish little information on transportation terms and this book fills a long felt need. It is printed in large clear type and cross references facilitate quick tracing of desired information.

1929. 119 pages, 5 x 7 inches, flexible. $1.75

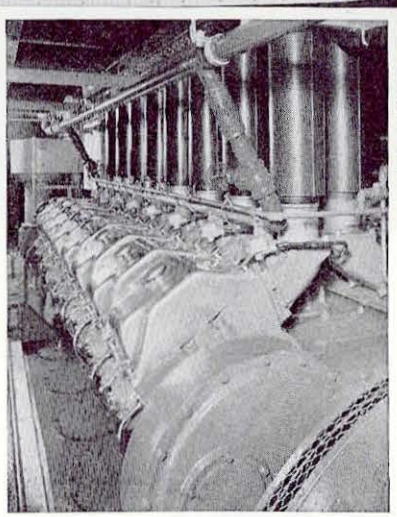
BANTAM Contributes to GREEN DIAMOND Success

THE GREEN DIAMOND IS EQUIPPED WITH BANTAM NEEDLE ROLLER WRIST PIN BEARINGS

● As is almost universally the case where Diesel Power is employed, the Illinois Central's new Green Diamond depends upon Bantam Needle Roller Wrist Pin Bearings.

The motor unit is a 1200 h.p. V Type 16 cylinder Winton Diesel Engine adapted by the Electro-Motive Corporation. Each of these capable manufacturers knows where to look for performance for every necessary part to assure maximum performance. Therefore, it is only natural that they, like 95% of the other users of such bearings, come to Bantam.

In looking for dependability in *any* bearing requirement you can well profit by the experience of these outstanding concerns.



A close-up of the Winton Diesel 1200 h.p. V Type 16 cylinder Engine which drives the Green Diamond. Bantam Needle Roller Bearings used on all Wrist Pins.

BBB

THE BANTAM BALL BEARING CO.

(SUBSIDIARY OF THE TORRINGTON CO.)

SOUTH BEND, INDIANA

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TAKE YOUR TOUGHEST BEARING JOB TO BANTAM

THE LARGEST STREAMLINED STEAM LOCOMOTIVES IN THE WORLD

SKF Spherical Roller Bearings are used in the lead trucks, trailers and tenders of 10 C.N.R. and 2 Temiskaming & Northern Ontario Railway locomotives.

Another modern locomotive makes its contribution to progress on SKF Spherical Roller Bearings. It's one of 12 new SKF-equipped steam engines, 5 of which are streamlined, that were recently placed in service by Canadian National Railways.

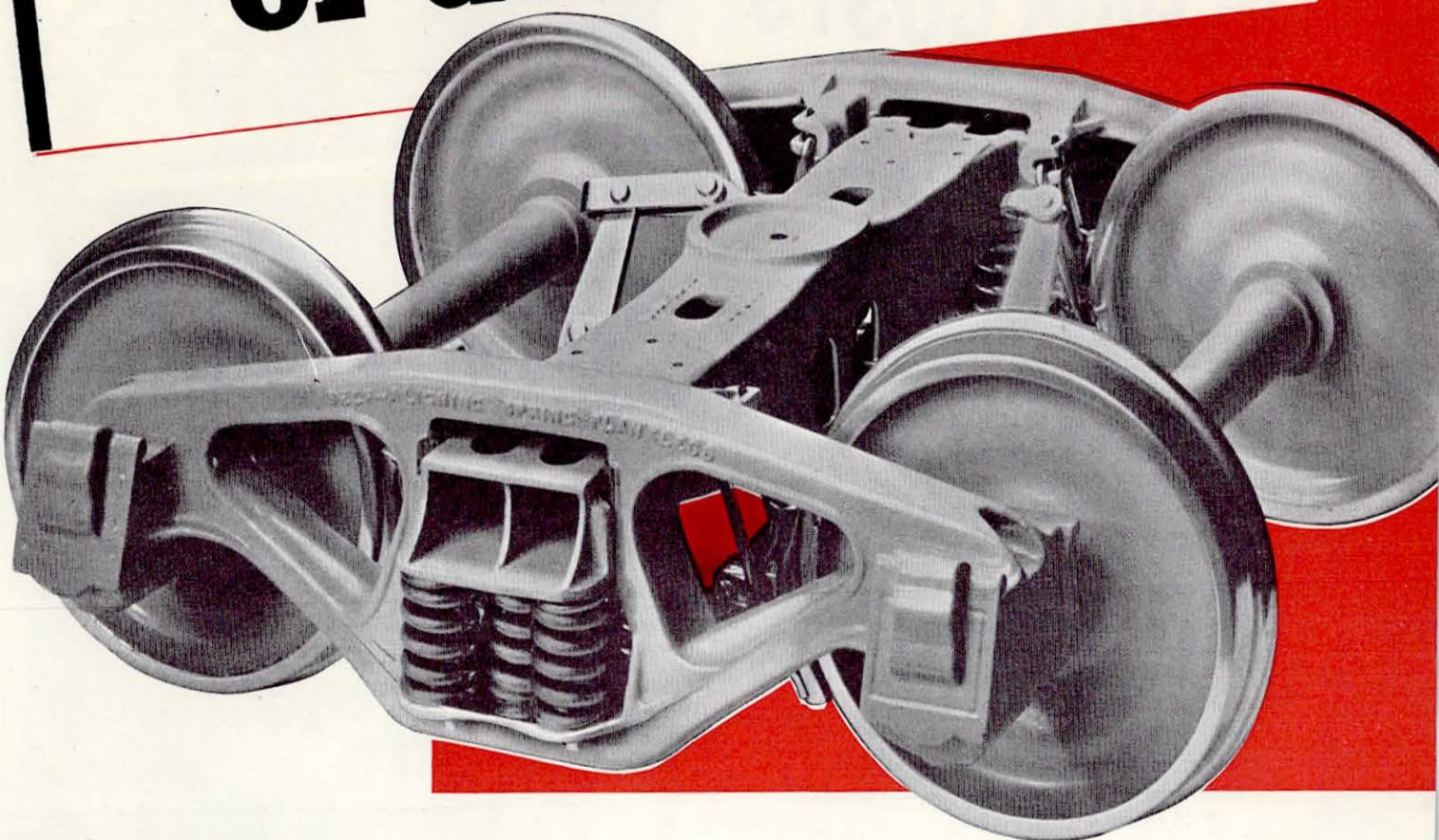
SKF
Roller Bearings

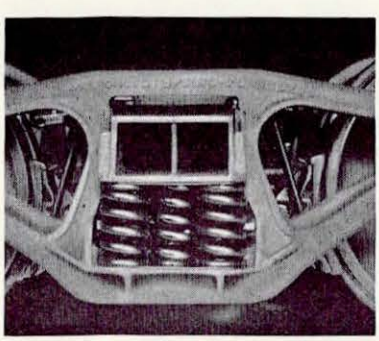
In fact, ALL locomotives on Canadian National Railways in 1935 and 1936 were equipped with SKF wherever anti-friction bearings were used. So SKF has a cause for pride in the knowledge that railroads, while changing the designs of their equipment, *continue* to depend upon SKF Bearings.

SKF INDUSTRIES, INC., Front St. & Erie Ave., Phila., Pa.

3687

35 *years* of development





The accessible spring seat of the Self-Aligning Truck is an important factor in reducing maintenance cost . . . it permits easy inspection, wheel removals and shimming.

Self-Aligning Trucks incorporate the best designs that have been produced through 35 years of development by cast steel truck specialists . . . 35 years during which numerous designs of bolsters, side frames, spring seats and brake arrangements have been devised, tested and discarded.

The design of Self-Aligning (spring-plankless) Trucks is based on sound engineering principles and standard construction. "Self-Aligning" are the most dependable, most economical trucks you can place under new or old equipment . . . maintenance cost is lower . . . operating cost is lower . . . first cost is no more than other constructions. *Specify "Self-Aligning."*

AMERICAN STEEL FOUNDRIES

NEW YORK • CHICAGO • ST. LOUIS

Licensed Manufacturer of Self-Aligning Trucks

SELF-ALIGNING TRUCKS

spring-plankless double-truss

UTILIZE DESIGNS OF PROVED DEPENDABILITY

QUESTION YOUR REPAIR COSTS *Here*

Leading Roads are Earning Surprising Economies with Socony-Vacuum Valve Oil

TO PREVENT costly damage, locomotives and cars must receive perfect lubrication specifically designed for each particular purpose.

S/V Locomotive Valve Oils are laboratory tested and road tested. With S/V Valve Oil, locomotive valves and cylinders receive perfect lubrication because S/V Valve Oils—

1. Atomize quickly and completely.
2. Supply complete coverage of both valves and cylinders.
3. Resist removal by water.
4. Give maximum freedom from carbon and gummy deposits.

Socony-Vacuum offers a complete line of lubricants which are designed specifically to serve the requirements of all types of railroad equipment.

Address inquiries to Socony-Vacuum Oil Company, Inc., Railroad Division, 26 Broadway, New York City; 59 East Van Buren Street, Chicago, Illinois; or affiliated companies.

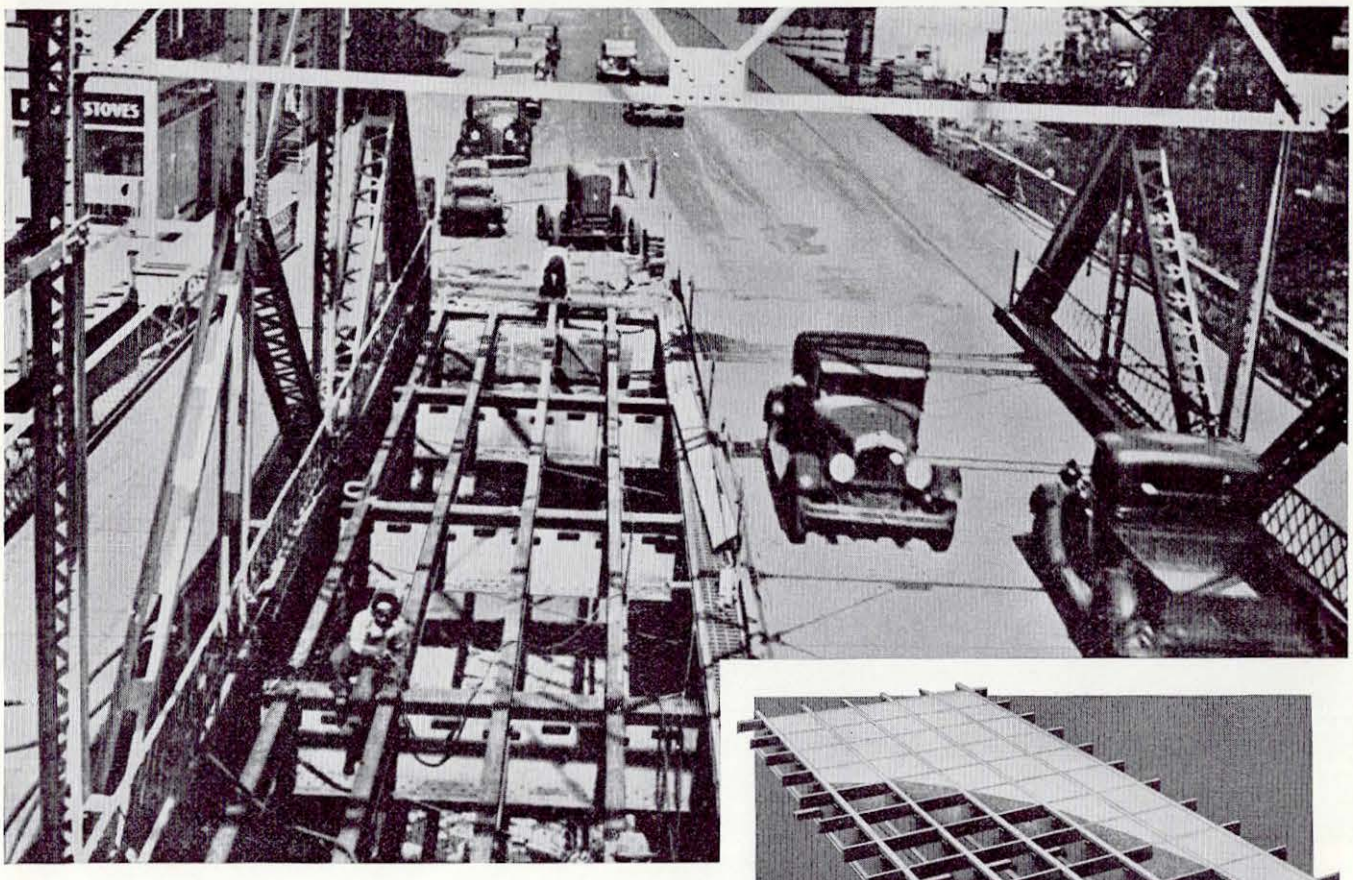
GARGOYLE Lubricants

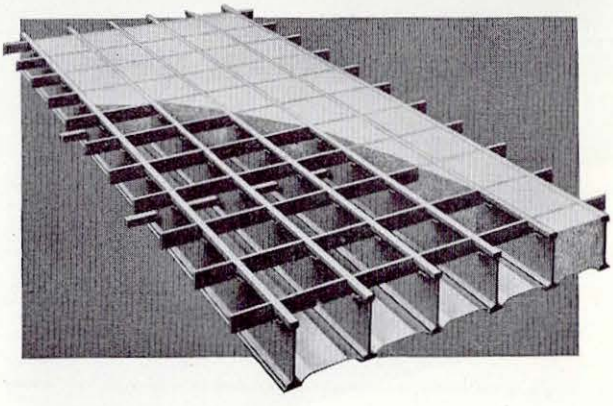
SOCONY-VACUUM OIL CO.

INCORPORATED

STANDARD OIL OF NEW YORK DIVISION · WHITE STAR DIVISION · LUBRITE DIVISION · WHITE EAGLE DIVISION
WADHAMS OIL COMPANY · MAGNOLIA PETROLEUM COMPANY · GENERAL PETROLEUM CORPORATION OF CALIFORNIA

DON'T CLOSE THAT BRIDGE!





DESIGNED BY *State Highway Department, built by Farris Engineering Co., this 168' bridge, on busy State Route 6, was recently refloored without once putting out the detour sign . . . another example of what I-Beam-Lok is doing to make possible easier, faster, more economical bridge reflooring.*

DON'T clog traffic just because a highway bridge needs reflooring. Forget about the detour signs. Use I-Beam-Lok and you can quickly repair or resurface bridge floors with minimum interruption to regular traffic flow.

That's exactly what happened on the reflooring job of the Warren, Pa. bridge pictured above. Located on State Route 6 this 168' bridge was completely refloored, with traffic moving steadily over it, even though stringers had to be raised to crown the new roadway.

Consider I-Beam-Lok for your next job. You'll like the ease and speed with which it is installed . . . its fireproof, long-life surface that is armored, anti-skid. And you'll like the way I-Beam-Lok ideally combines the superior qualities of both steel and concrete to increase the live-load capacity of bridges without sacrificing flooring strength. Write for a list of recent installations. Let us tell you about the new I-Beam-Lok unit that even further reduces cost.

THIS DRAWING *shows significant details of the new 4¼" I-Beam-Lok section. Spacing of both the I-Beams and the cross bars has been increased to 6" centers. The results? Lower purchase price and installation costs. Increased depth and rigidity. Number of field welds cut by ⅓.*

USS I·BEAM·LOK *Armored*

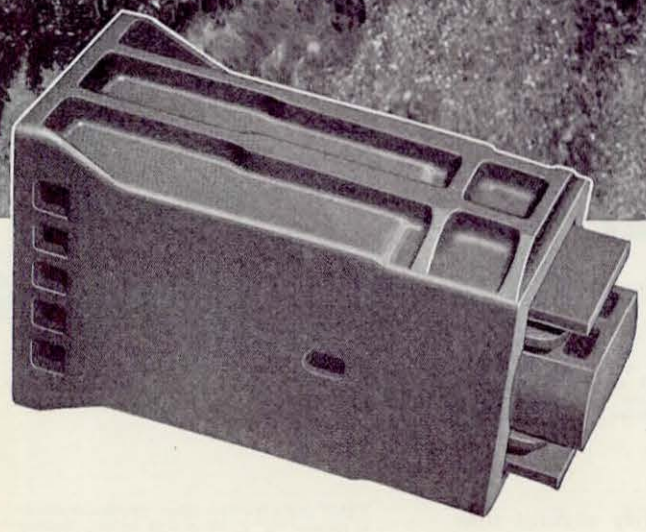
CARNEGIE-ILLINOIS STEEL CORPORATION

Pittsburgh — *Chicago*

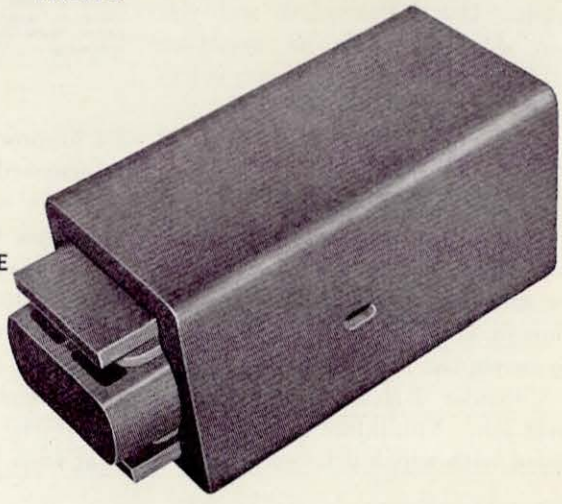
Columbia Steel Company, San Francisco, *Pacific Coast Distributors*

United States Steel Products Company, New York, *Export Distributors*

UNITED STATES STEEL



CARDWELL WESTINGHOUSE
FRICTION DRAFT GEAR
NY-11-E



CARDWELL WESTINGHOUSE
FRICTION DRAFT GEAR
NZ-11-E

CARDWELL FRICTION
TRUCK SPRING

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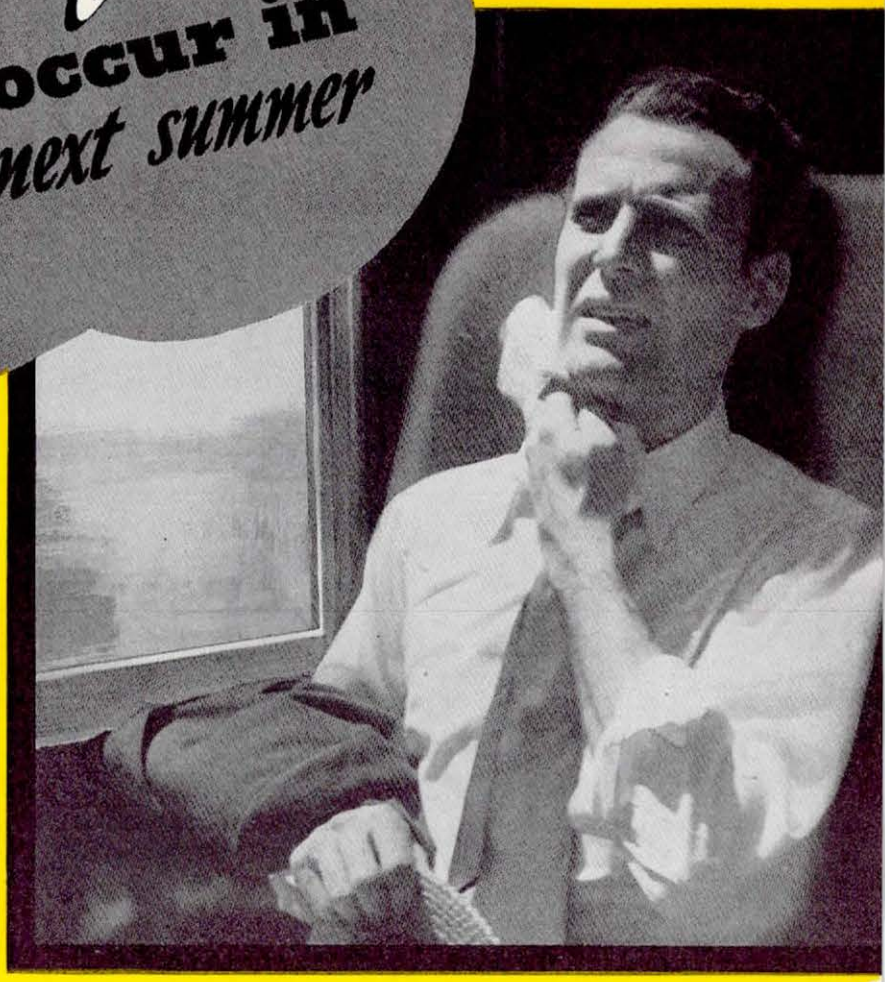

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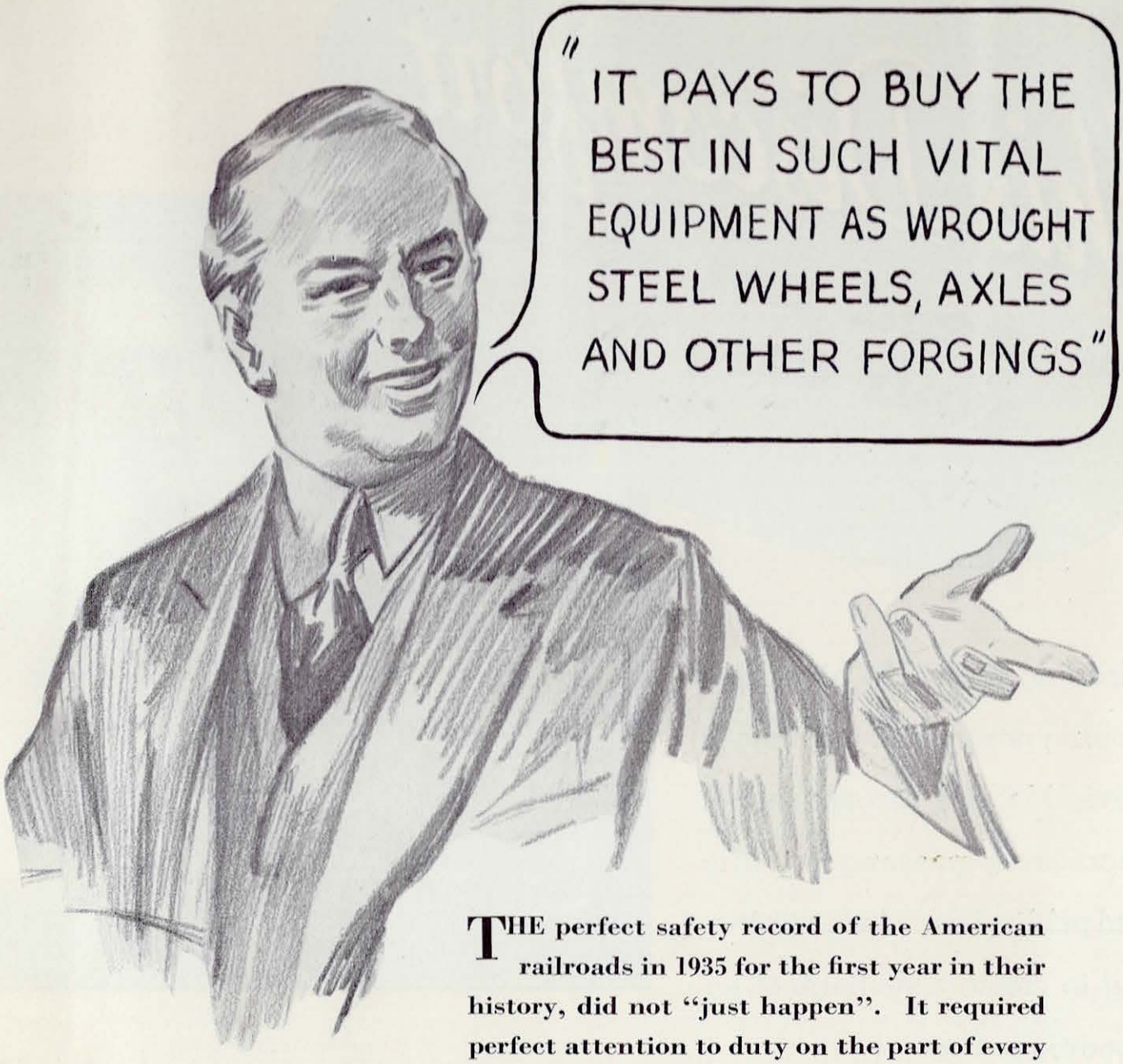

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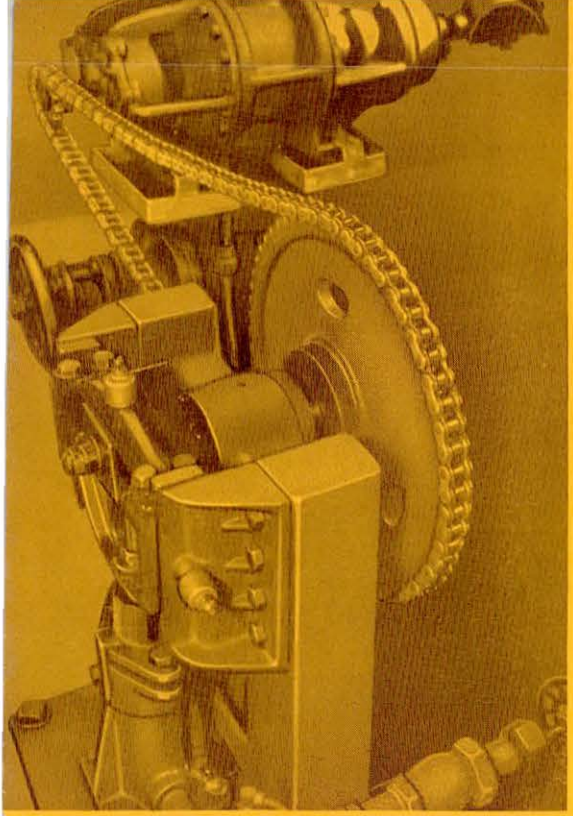

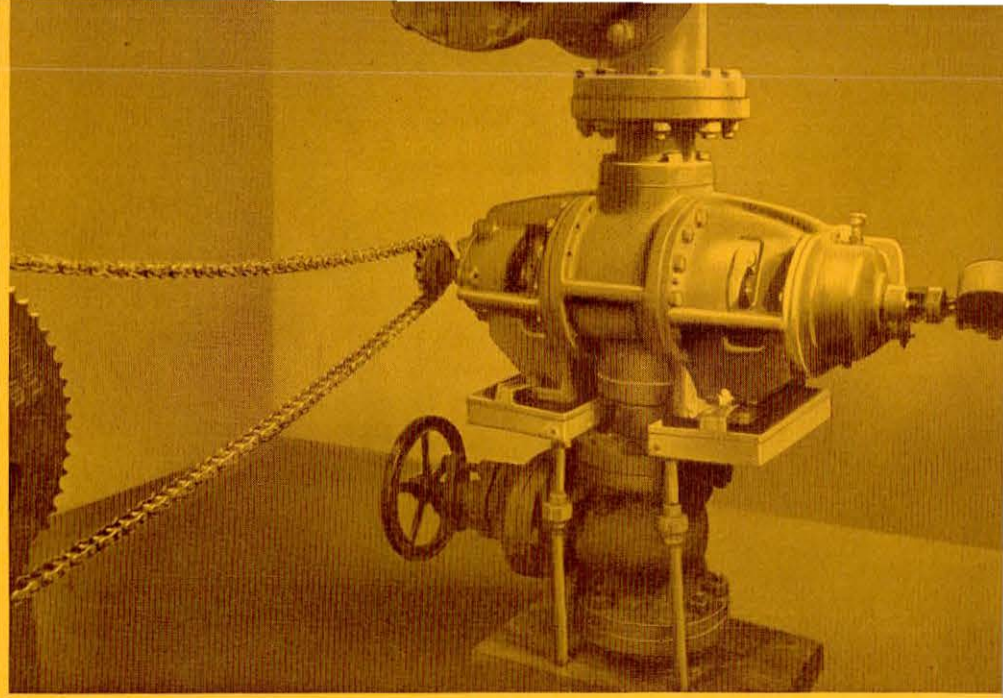

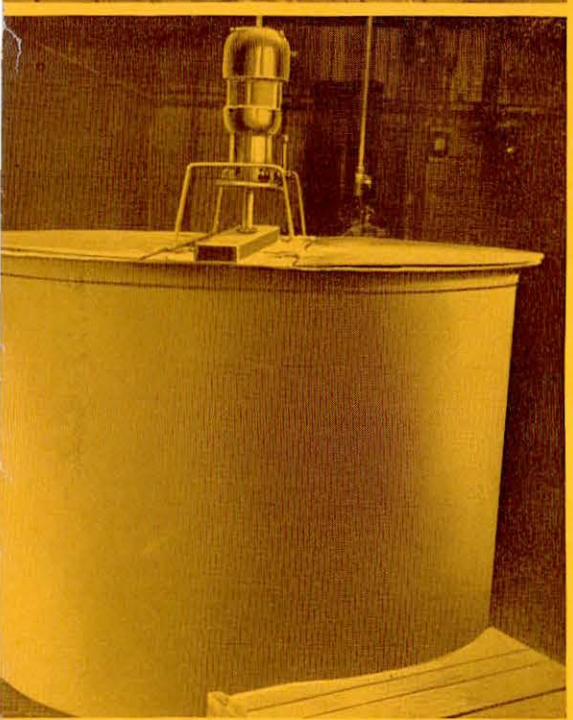

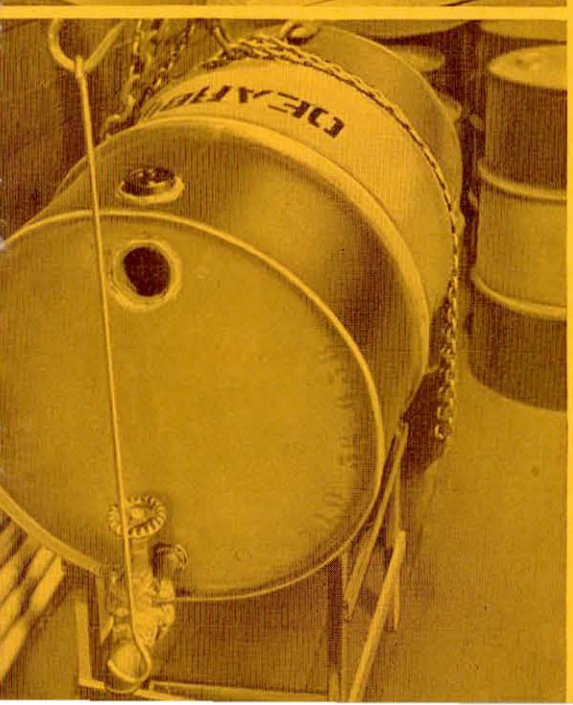

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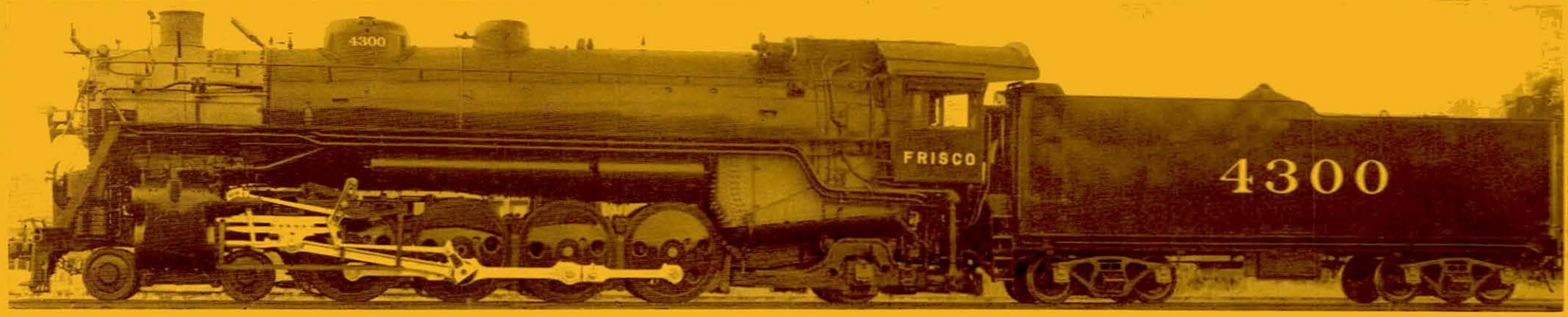

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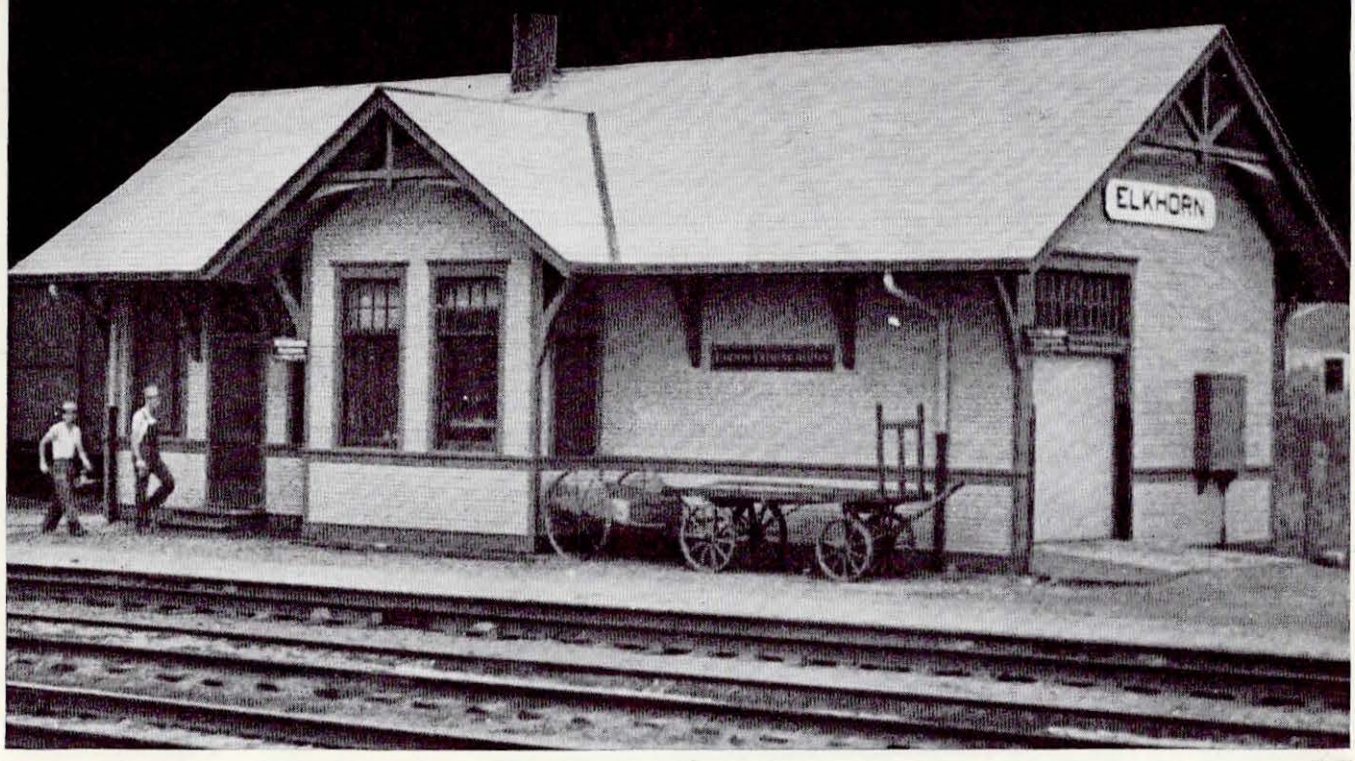

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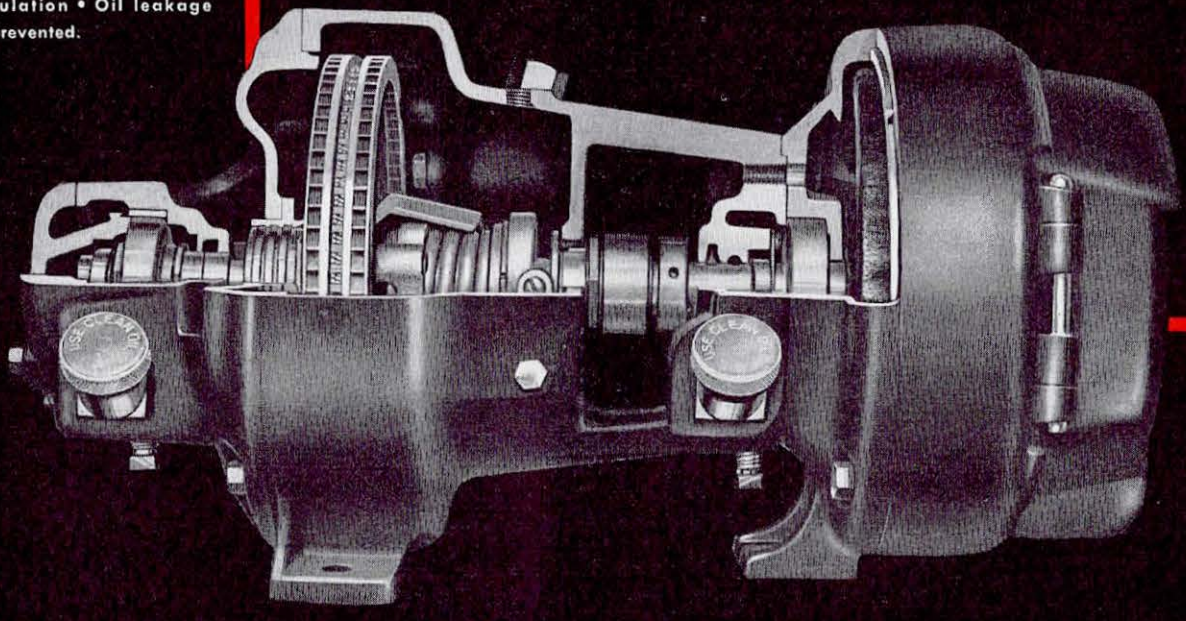

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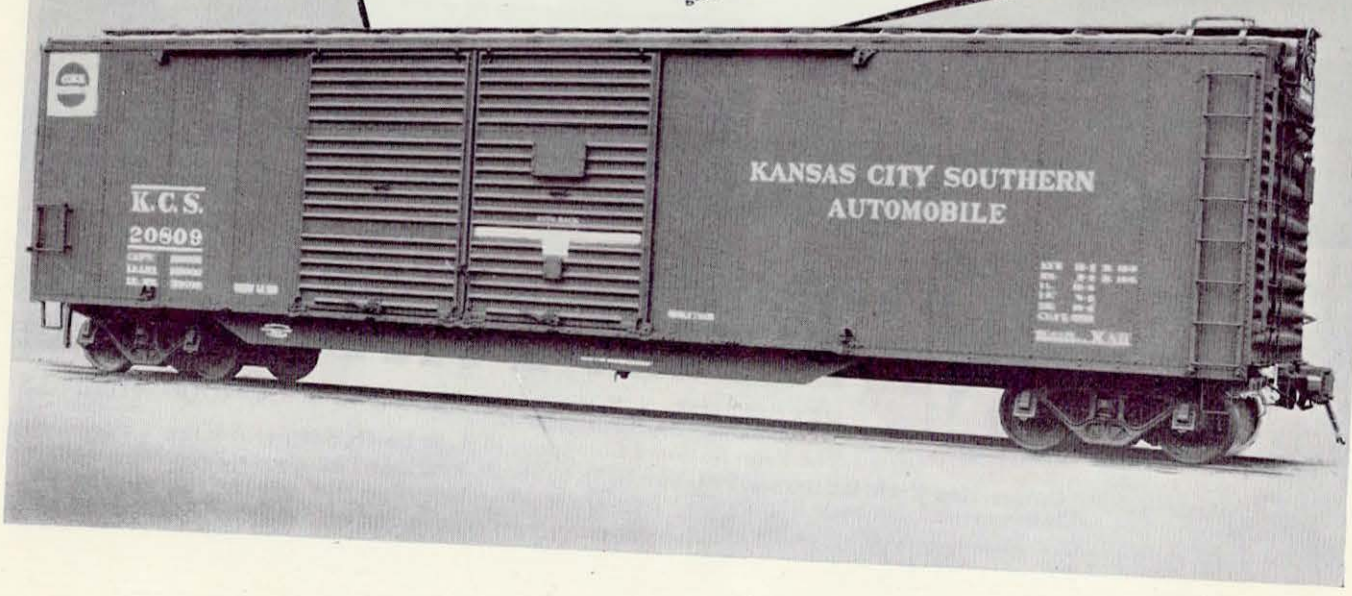

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Railway Age

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Vol. 101 September 19, 1936 No. 12

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Seaboard Air Line Installs Diesel-Powered Rail Car 409

A description of this mail-baggage-power unit which was built by the Electro-Motive Company for use with standard passenger equipment.

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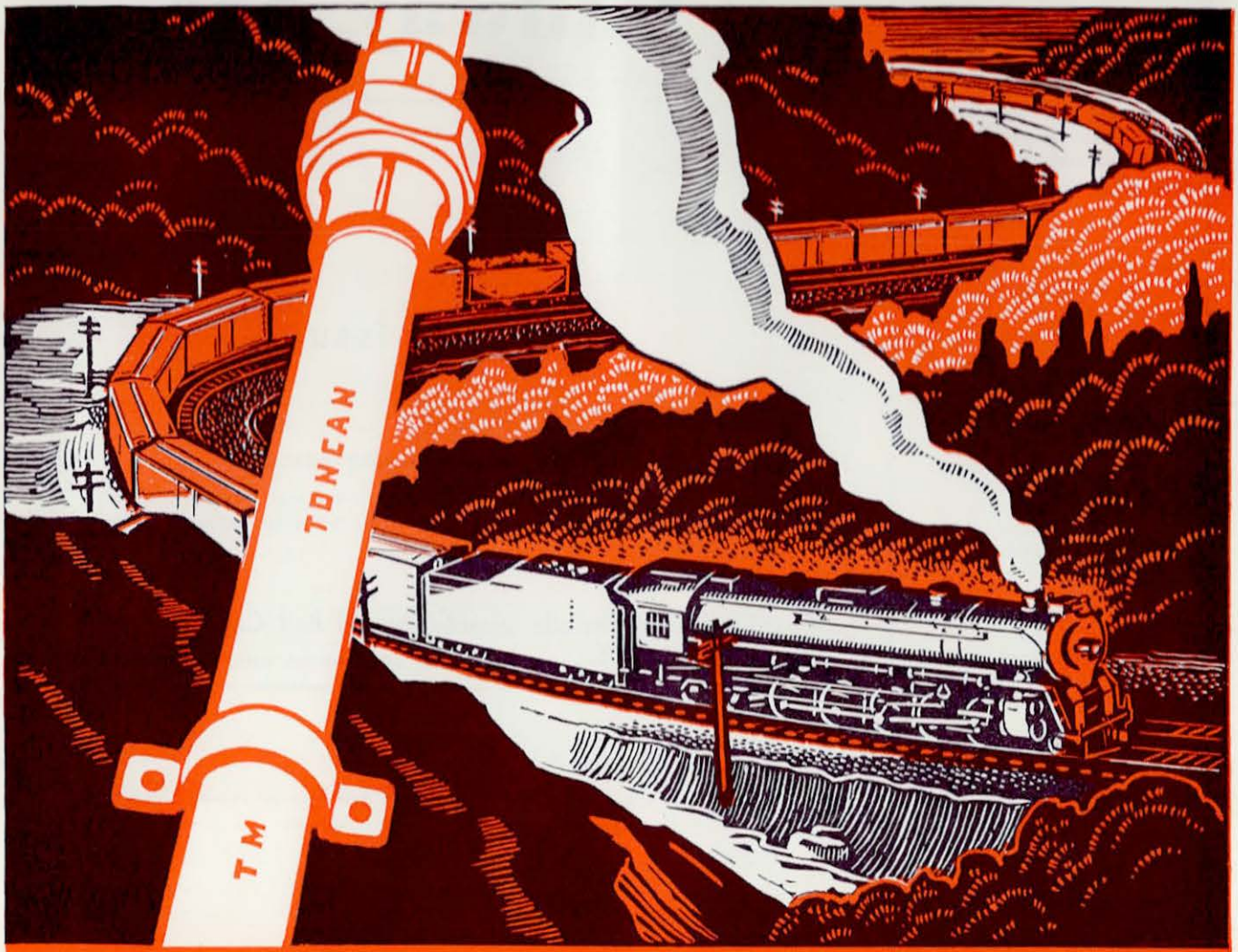

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with the objective of reform

Courtesy Chatt

RAILWAY AGE

Old Deal and New Deal

In its issue of August 29 the *Railway Age* published an editorial entitled "The 'Class Struggle' and Capitalism." It criticised the functioning of capitalism under the Old Deal because it caused, or at least did not prevent, the depression.

This editorial has called forth some interesting and significant comments. The president of a manufacturing company wrote that much of the losses suffered by business during the depression were due to carrying on payrolls employees who were not needed, and raised a question as to whether we criticised this. We replied that we did not criticise it, and that "The important and fundamental reason for the losses incurred was the decline in the national income produced from $81,000,000,000 in 1929 to less than $40,000,000,000 in 1932" before the New Deal began.

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The editorials published within recent years in the *Railway Age* have lacked clarity if they have not shown that this paper is neither an Old Dealer nor a New Dealer—that it is opposed to the principal policies of the New Deal, but equally opposed to continuance or restoration of important policies of government and business that prevailed under the Old Deal.

Railways under the Old Deal

The period of the Old Deal was the years 1921-1932, inclusive. Can anybody identified with the railway industry or the railway manufacturing industry recall what occurred during that period with satisfaction or approval? The railways were returned to private operation in 1920 under federal legislation assuring that, under honest, efficient and economical operation, they would be afforded opportunity by government to earn a fair return. Even in the most prosperous years of this period they never were allowed to earn it. In 1921-1929, inclusive, they earned an average of only 4.28 per cent on property investment. One reason was that in 1922, when the country was still in the midst of the post-war depression, freight rates were reduced 10 per cent. Another reason was that the passenger traffic of the railways greatly declined and the increase in their freight traffic was abnormally small. Between 1900 and 1910 their freight traffic increased 8 per cent annually; between 1910 and 1920, more than 6 per cent annually; and between 1920 and 1929, only 1 per cent annually.

What occurred that caused railway freight business to increase relatively only one-seventh as much annually during this period as during the preceding twenty years? There was a decline in the rate of increase in the total production and distribution of commodities. But this was not all. There was a large diversion of traffic to other carriers due to government subsidization of these carriers by huge expenditures upon waterways and highways and to failure to apply federal and state regulation to them while regulation of railways was being made increasingly stringent and restrictive. These policies of the Old Deal were stoutly defended and supported by many captains of industry who are now very vocal in denouncing attempts by New Dealers similarly to regiment their own industries and subsidize competition with them.

Railways During the Depression—Old Deal and New Deal

After the depression began, in response to the request of President Hoover the railways maintained

their capital expenditures in
1930 and 1931. Largely becau
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three depression years 1930-1
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The New Deal, unlike the
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But the only result has been t
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repeal of the long-and-short-h
the railways alone; and there
New Dealer tried to call him

The railways were "coming
throughout the eleven months
From that time to the present
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prices of equipment, materia
Deal promoted advances in w
the railways. Its Railroad R
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calculated greatly to increase

New Deal Effects on Railways

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1935, subsequent to its destr
Court. Furthermore, the New
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Deal did. Total annual fed
waterways and highways und
four years 1929-1932, inclusive
Total annual federal expendi
the New Deal have increased t
than 300 per cent.

During the three years of
inclusive, under the Old Deal
average return of 2.2 per cent
they earned an average of 1.8
years 1933-1935, inclusive, an
2.3 per cent in the first seven
Deal policies have seriously i
crease in employment by the
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is extremely doubtful if the i
ployment and buying that ha
last year would or could have
ness and railway traffic had

Typical Single-Track Main Line on the Santa Fe

Thirty-Five Years of

More than a third of a century of investigation, involving study of 2,000,000 ties, now paying large dividends in reduced renewals on the Santa Fe

ONE of the most outstanding examples of scientific research ever undertaken by an individual railroad is that which the Atchison, Topeka & Santa Fe has carried on continuously for more than a third of a century for the purpose of obtaining the maximum economy in the use of its crossties. This investigation, since its beginning in 1902, has involved the study and observation of 2,117,271 individual crossties treated with some 26 different timber preservatives or combinations of preservatives and involving more than 25 different species of domestic woods, in addition to several varieties of foreign woods. Of these ties, 1,176,064 are still in service and under observation, the remainder having been removed from track because of decay or other types of failure. At present, the road has under observation 57 test installations comprising a total of 400 miles of tracks.

The motivating force behind these investigations had its origin primarily in two considerations. In the first place, with more money being expended annually for crossties than for any other single commodity except fuel (the road has more than 60,000,000 ties in tracks today, involving an investment exceeding $120,000,000), the road was quick to visualize the extent of the savings that could be effected by a substantial reduction in the number of annual crosstie renewals. In the second place, as a consequence of the prevailing high crosstie renewal rate and the heavy demands for the construction of new lines, domestic supplies of timber were being consumed at such a rapid rate that fear was arising in many quarters that a severe shortage of timber was imminent. Recognizing that the problem thus presented called for the formulation of measures that would effect a substantial increase in the life of crossties, which in 1900 was about nine years, the Santa Fe embarked on a determined effort to develop the most effective methods of preventing their decay and mechanical destruction.

In undertaking this work the road was entering practically a virgin field. While various railways, including the Santa Fe, had been treating ties, mostly with zinc chloride, on a limited scale for years, little really scientific study had been undertaken to extend the limited gains already made. Thus, in the field of timber crosstie preservation and protection, the Santa Fe has been a pioneer, and its efforts along this line have constituted both an inspiration and a pattern for many other lines.

Basing its tie treating and handling practices on the results of its investigations, and revising these practices from year to year as further information has been developed, the Santa Fe has made steady progress in extending the average service life of its crossties. Twenty-five years ago the average life of untreated crossties on the Santa Fe was about 10 years; today the average service life of main track ties is about 22 years, while some of the test groups are averaging better than 25 years' life.

An even better picture of what has been accomplished may be obtained by a glance at the annual tie renewal figures. For the five-year period ending with 1909, the average number of ties inserted annually per mile of track was 266. In 1914, this figure had dropped to 230; in 1919, to 174; in 1924, to 143; in 1929, to 141; and in 1934, to 104, the latter figure being no doubt affected in some measure by the generally reduced level of maintenance expenditures that prevailed during these years.

It is difficult to estimate the savings in dollars that the Santa Fe has effected as a result of its crosstie investigations. If this and other roads had not employed timber preservatives on a large scale during the last 25 years, it is reasonable to assume that domestic sources of timber suitable for crossties would be depleted to the point where the cost of timber crossties would be much higher than it actually is. Furthermore, the deterioration in the quality of timbers available to the Santa Fe today, as compared with those used 25 years ago, brings the average life of these timbers, untreated, down to not more than 6 years. On the basis, however, of the figures for tie renewals quoted in the preceding paragraph and assuming the present cost of an untreated tie inserted in track to be $1.50, tie renewals currently cost the Santa Fe at least $4,500,000 less an-

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Railways under the Old Deal

The period of the Old Deal was the years 1921-1932, inclusive. Can anybody identified with the railway industry or the railway manufacturing industry recall what occurred during that period with satisfaction or approval? The railways were returned to private operation in 1920 under federal legislation assuring that, under honest, efficient and economical operation, they would be afforded opportunity by government to earn a fair return. Even in the most prosperous years of this period they never were allowed to earn it. In 1921-1929, inclusive, they earned an average of only 4.28 per cent on property investment. One reason was that in 1922, when the country was still in the midst of the post-war depression, freight rates were reduced 10 per cent. Another reason was that the passenger traffic of the railways greatly declined and the increase in their freight traffic was abnormally small. Between 1900 and 1910 their freight traffic increased 8 per cent annually; between 1910 and 1920, more than 6 per cent annually; and between 1920 and 1929, only 1 per cent annually.

What occurred that caused railway freight business to increase relatively only one-seventh as much annually during this period as during the preceding twenty years? There was a decline in the rate of increase in the total production and distribution of commodities. But this was not all. There was a large diversion of traffic to other carriers due to government subsidization of these carriers by huge expenditures upon waterways and highways and to failure to apply federal and state regulation to them while regulation of railways was being made increasingly stringent and restrictive. These policies of the Old Deal were stoutly defended and supported by many captains of industry who are now very vocal in denouncing attempts by New Dealers similarly to regiment their own industries and subsidize competition with them.

Railways During the Depression—Old Deal and New Deal

After the depression began, in response to the request of President Hoover the railways maintained

their capital expenditures in 1930 and their wages in 1930 and 1931. Largely because of this and of what the Old Deal had already done to them, the average return earned on railway property investment declined in the three depression years 1930-1932, inclusive, to 2.2 per cent, and their purchases from the railway equipment and supply manufacturing industry declined from $1,442,000,000 in 1929 to an annual average of less than $470,000,000 in 1931 and 1932. The railways and the railway equipment and supply manufacturing industry certainly have no reason for desiring a restoration of the Old Deal.

The New Deal, unlike the Old Deal, deserves credit for having advocated some federal legislation to equalize the regulation of railways and competing carriers. But the only result has been the passage of the Motor Carrier Act. A New Dealer, Senator Wheeler of Montana, carried on a one-man filibuster that prevented repeal of the long-and-short-haul law that applies to the railways alone; and there is no evidence that any New Dealer tried to call him off.

The railways were "coming back" with the nation throughout the eleven months ending with July, 1933. From that time to the present the New Deal has been loading them with handicaps. NRA advanced the prices of equipment, materials and fuel. The New Deal promoted advances in wages, including those on the railways. Its Railroad Retirement Acts, Social Security Act and undistributed earnings tax act are calculated greatly to increase their taxes.

New Deal Effects on Railways

Throughout the two years from July, 1933, to July, 1935, the New Deal's major policies prevented increase of total production and of railway freight traffic. In fact, all the increase of railway freight traffic since the bottom of the depression occurred prior to August, 1933, before NRA was in effect, and since July, 1935, subsequent to its destruction by the Supreme Court. Furthermore, the New Deal is subsidizing competition with the railways much more than the Old Deal did. Total annual federal expenditures upon waterways and highways under the Old Deal in the four years 1929-1932, inclusive, averaged $244,000,000. Total annual federal expenditures upon them under the New Deal have increased to $989,000,000, or more than 300 per cent.

During the three years of depression, 1930-1932, inclusive, under the Old Deal the railways earned an average return of 2.2 per cent. Under the New Deal they earned an average of 1.85 per cent in the three years 1933-1935, inclusive, and at an annual rate of 2.3 per cent in the first seven months of 1936. New Deal policies have seriously interfered both with increase in employment by them and with increase in their buying from the manufacturing industry; and it is extremely doubtful if the increases in railway employment and buying that have occurred within the last year would or could have occurred if general business and railway traffic had not been stimulated and railway expenses curtailed by decisions of the Supreme Court invalidating some of the principal New Deal policies.

Old Deal Facts

The railways and the railway manufacturing industry have been affected not only by the Old Deal and New Deal government policies applied specifically to transportation, but also by all the Old Deal and New Deal government and business policies that have helped to cause, deepen and protract the depression and thereby to curtail railway gross and net earnings and buying power. The New Deal has hindered recovery in business in general, including the railway industry and the railway manufacturing industry. But the national income declined more than 50 per cent between 1929 and 1932 before the New Deal began. During the three years 1930-1932, inclusive, the business of the country as a whole made almost four-fifths of the total losses that it suffered during the six years ending with 1935. However disagreeable they may be to opponents of the New Deal, these are facts, and constitute, this paper believes, sufficient reason why no intelligent person should desire restoration of many of the government and business policies that constituted the Old Deal.

What Caused the Depression?

We have tried in previous editorials to make clear what government and business policies of the Old Deal we believe helped to cause the depression. We have emphasized the Old Deal policies that caused great over-expansion of means of transportation and helped, when depression came, to threaten the railroad industry with a complete bankruptcy that might have made government ownership unavoidable. We have emphasized the lack of balance that existed during the 20's between agriculture and industry and which the Old Deal did virtually nothing to remedy. We have emphasized that monopoly practices tending to make prices in many industries inflexible while prices of agricultural products were highly flexible helped to cause and increase this lack of balance. We have recalled how the most gigantic and insane stock market speculation in history, which could end only in collapse of prices of securities, was promoted and led by leaders in finance and business who should have foreseen more clearly than anybody else what the inevitable result would be.

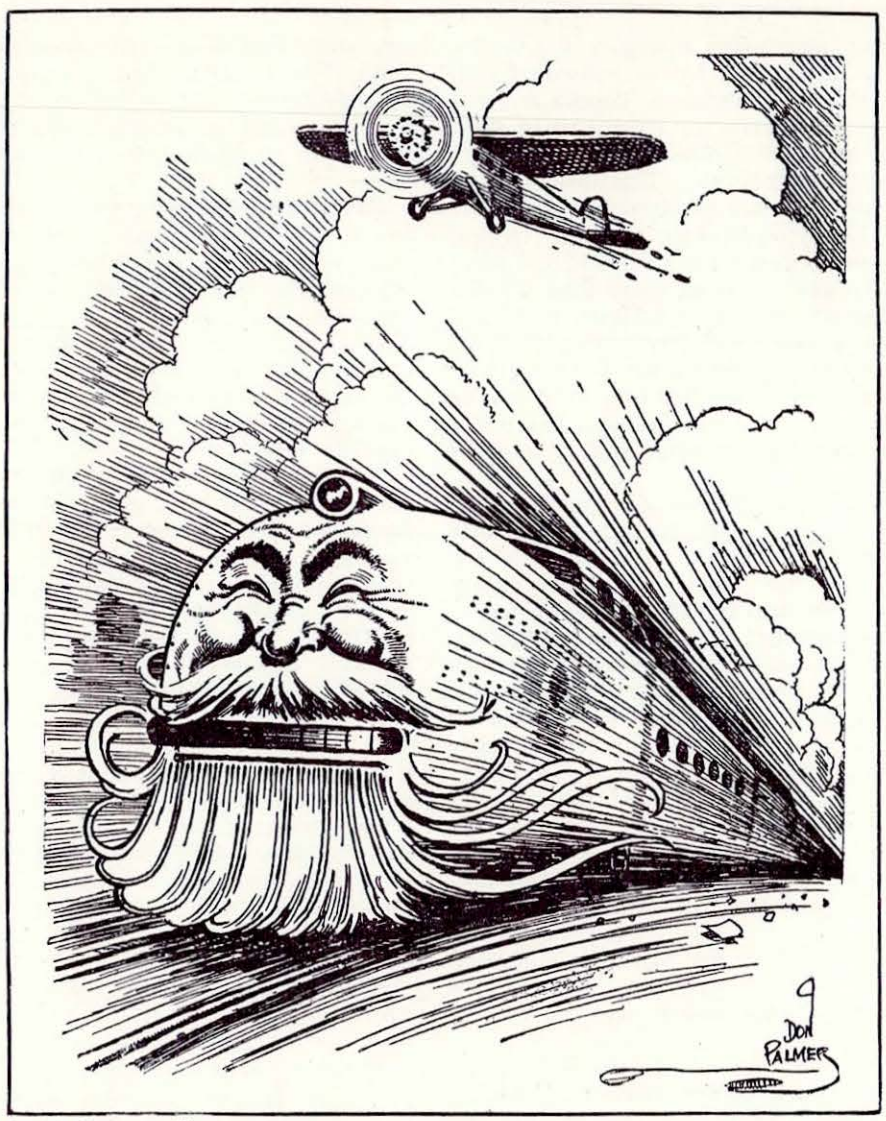
Meantime, what have the former leaders of the Old Deal in government and business been doing and saying? We hear and read many criticisms by them of New Deal policies, but almost no criticism or even discussion by them of the government and business policies that prevailed during the seven years of seeming prosperity 1923-1929, inclusive, or in the three years of undoubted depression 1930-1932. This paper agrees with them in opposing the major New Deal policies, and especially those of government regimentation of all industry and commerce under a planned

economy, and of huge and reckless government spending largely to promote government subsidized competition with industry. In fact, we were opposing such policies long before the New Deal began, when most business men were promoting their application to transportation, and, also, later when most business men were supporting their application to business in general under NRA, and we are still opposing them.

Where is the Needed Leadership?

But the fact that they had to be opposed before the New Deal began shows that the capitalistic system is not going to be saved and made to work in the interest of all business and all the people merely by beating the New Deal. If it had been working in the best interest of all business and all the people under the Old Deal we would not have had the longest and worst depression in all history. There is just as plain and vital need, therefore, for thoroughgoing research and action with the objective of reform of Old Deal unsound economic policies as for prevention of continuance and increase of unsound New Deal economic policies.

The question raised by the writer of one of the letters quoted above "whether capitalism has the leadership that will enable us to escape the disadvantages of class domination in the class struggle in which we will be a weak and inefficient minority" is a most pertinent and important one. Never before did capitalism so need financial and business leadership that would both reform and defend it. And nowhere does it need it more than in this country. But if it has available such leadership in this country, this leadership has thus far been remarkably inarticulate and inactive regarding the problems that it is principally its duty to help solve. Governor Landon's speech at Portland, Maine, last week was a very courageous, able and sound discussion of some of these problems. Business leadership cannot intelligently or consistently criticise political leadership if it leaves political leadership alone to face and solve the most important problems of capitalism.

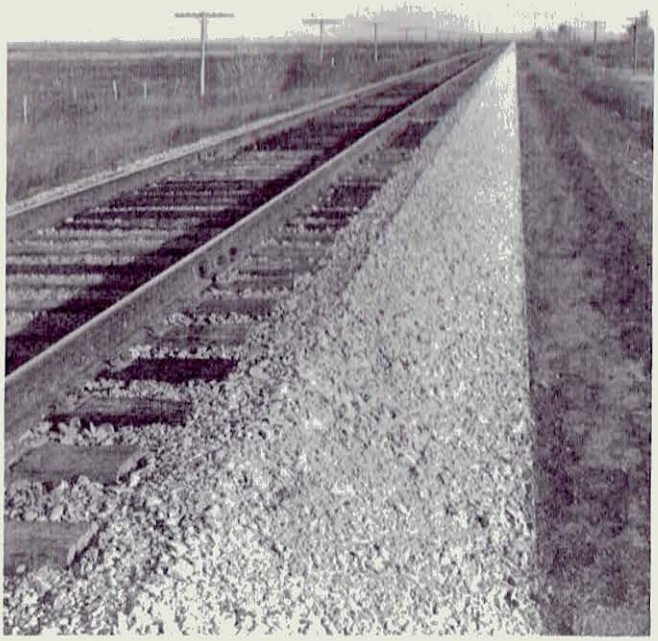


Courtesy Chattanooga Times

A Lot of Life in the Old Boy Yet!

Thirty-Five Years of

More than a third of a century of investigation, involving study of 2,000,000 ties, now paying large dividends in reduced renewals on the Santa Fe



Typical Single-Track Main Line on the Santa Fe

ONE of the most outstanding examples of scientific research ever undertaken by an individual railroad is that which the Atchison, Topeka & Santa Fe has carried on continuously for more than a third of a century for the purpose of obtaining the maximum economy in the use of its crossties. This investigation, since its beginning in 1902, has involved the study and observation of 2,117,271 individual crossties treated with some 26 different timber preservatives or combinations of preservatives and involving more than 25 different species of domestic woods, in addition to several varieties of foreign woods. Of these ties, 1,176,064 are still in service and under observation, the remainder having been removed from track because of decay or other types of failure. At present, the road has under observation 57 test installations comprising a total of 400 miles of tracks.

The motivating force behind these investigations had its origin primarily in two considerations. In the first place, with more money being expended annually for crossties than for any other single commodity except fuel (the road has more than 60,000,000 ties in tracks today, involving an investment exceeding $120,000,000), the road was quick to visualize the extent of the savings that could be effected by a substantial reduction in the number of annual crosstie renewals. In the second place, as a consequence of the prevailing high crosstie renewal rate and the heavy demands for the construction of new lines, domestic supplies of timber were being consumed at such a rapid rate that fear was arising in many quarters that a severe shortage of timber was imminent. Recognizing that the problem thus presented called for the formulation of measures that would effect a substantial increase in the life of crossties, which in 1900 was about nine years, the Santa Fe embarked on a determined effort to develop the most effective methods of preventing their decay and mechanical destruction.

In undertaking this work the road was entering practically a virgin field. While various railways, including the Santa Fe, had been treating ties, mostly with zinc chloride, on a limited scale for years, little really scientific study had been undertaken to extend the limited gains already made. Thus, in the field of timber crosstie preservation and protection, the Santa Fe has been a pioneer, and its efforts along this line have constituted both an inspiration and a pattern for many other lines.

Basing its tie treating and handling practices on the results of its investigations, and revising these practices from year to year as further information has been developed, the Santa Fe has made steady progress in extending the average service life of its crossties. Twenty-five years ago the average life of untreated crossties on the Santa Fe was about 10 years; today the average service life of main track ties is about 22 years, while some of the test groups are averaging better than 25 years' life.

An even better picture of what has been accomplished may be obtained by a glance at the annual tie renewal figures. For the five-year period ending with 1909, the average number of ties inserted annually per mile of track was 266. In 1914, this figure had dropped to 230; in 1919, to 174; in 1924, to 143; in 1929, to 141; and in 1934, to 104, the latter figure being no doubt affected in some measure by the generally reduced level of maintenance expenditures that prevailed during these years.

It is difficult to estimate the savings in dollars that the Santa Fe has effected as a result of its crosstie investigations. If this and other roads had not employed timber preservatives on a large scale during the last 25 years, it is reasonable to assume that domestic sources of timber suitable for crossties would be depleted to the point where the cost of timber crossties would be much higher than it actually is. Furthermore, the deterioration in the quality of timbers available to the Santa Fe today, as compared with those used 25 years ago, brings the average life of these timbers, untreated, down to not more than 6 years. On the basis, however, of the figures for tie renewals quoted in the preceding paragraph and assuming the present cost of an untreated tie inserted in track to be $1.50, tie renewals currently cost the Santa Fe at least $4,500,000 less an-

Continuous Crosstie Research

nually than they would cost the road if it had not adopted timber treatment.

When the Santa Fe first embarked on its crosstie investigation, the task confronting it was a formidable one. With its lines extending west from Chicago to Los Angeles and San Francisco on the Pacific Coast and south to Galveston on the Gulf of Mexico, it was faced with the necessity of developing treating practices and choosing woods suitable for the arid climate of the Southwest, the heavy rainfall and high humidity of East Texas and the moderate rainfall of the Middle West. Moreover, in view of the fact that no extensive high grade hardwood forests are contiguous to its lines, except in Louisiana and Texas, it was necessary to work generally with such inferior soft woods as pine, Douglas fir, Port Orford cedar and redwood. Finally, being a pioneer in the timber preservation field, the road had little precedent to guide its early efforts.

Santa Fe Practice

Ties are laid 10¼ in. apart (approximately 3,250 to the mile), main track.

Ties are full 6 in. by 8 in. or 7 in. by 8 in., 8 ft. long.

Ties are brought from the woods to the seasoning yard within 30 days after cutting.

Ends are cut off all ties before treatment to detect any interior decay.

All ties are bored, adzed and grooved for tie plates before treatment.

Ties are treated with mixture of 50 per cent low-residue creosote and 50 per cent petroleum at Somerville and Wellington plants and with 45-55 mixture at Albuquerque and National City plants.

All ties are protected with tie plates of adequate size (8 in. by 10½ in. for 112-lb. rail).

Each kind of tie is assigned to specific service—hardwood ties to curves, etc.

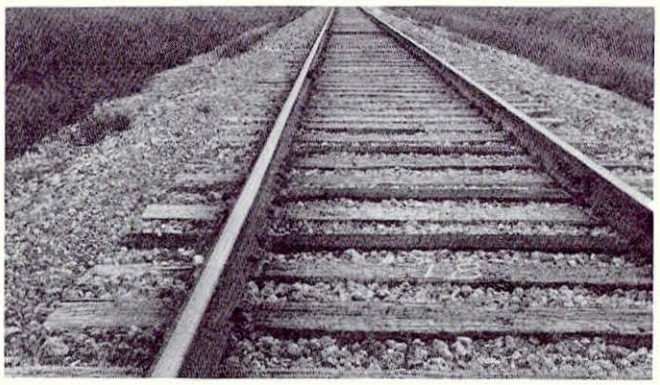
Constant inspection of track maintenance practices is provided to detect and correct practices destructive to ties.

All ties are machine branded to show kind of wood, grade of tie, treatment, year treated and weight of rail for which bored. Dating nails are applied to all ties as inserted.

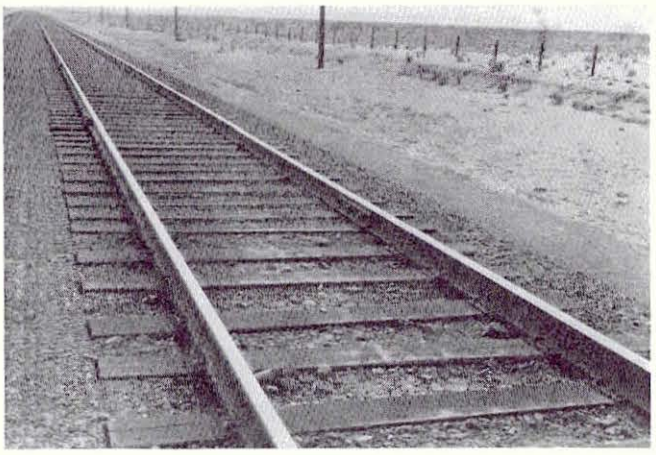
The Santa Fe first undertook the preservative treatment of crossties on a large scale in 1885, when 111,503 ties were treated with zinc chloride. From then on the number of ties treated annually showed a generally upward trend, until about 1900, when 2,645,219 ties were treated. For the next 20 years, the number of ties treated by the company remained at a fairly constant level, although the mileage of main and side tracks operated increased from 9,028 in 1900 to 18,474 in 1926. In 1927, however, the number of ties treated jumped to an all-time high of 4,191,182. The number of ties treated by the Santa Fe to December 31, 1935, reached the stupendous total of 106,991,976. Since 1924, practically all tie renewals made on the Santa Fe have been with treated timber.

Distribution of Woods

A fundamental phase of the Santa Fe's crosstie investigations has had for its object the selection of those species, grades and sizes of ties best fitted for its service and their allocation to those tracks where they are best adapted to the traffic, climatic and service conditions. In this work the road has had as principal available sources of supply the yellow pine district of Eastern Texas and Western Louisiana, which also supplies some oak and gum; the mountain pine area of Arizona and New Mexico; the Douglas fir forests of the Northwest; and the redwood and cedar areas of California. Following extensive tests with preservatives, each of these



Portion of a Test Track Between Sylvia, Kan., and St. John. The Average Life of These Creosoted Hewn Southern Pine Ties Is 24.5 Years



A Portion of the Kingman (Ariz.) Test Track, Showing the Condition, After Seven Years' Service, of Sawn Western Yellow Pine Ties Treated with a Mixture of Zinc Chloride, Creosote and Oil

woods has been designated for use on those lines where it gives the best results, with respect to service and availability. For instance, Douglas fir ties are treated at the National City (Cal.) plant and inserted in the lines west of Cadiz, Ariz., although it is practicable to use these ties as far east as Albuquerque; the mountain pine ties are treated at the Albuquerque (N. M.) plant and installed generally east of Cadiz and west of Newton, Kan., Waynoka, Okla., and Sweetwater, Tex. Yellow pine, oak and gum ties from the Gulf states are treated at the Somerville, Tex., plant and the same woods from Oklahoma and Arkansas are treated at the Wellington, Kan., plant. The soft woods from the Somerville and Wellington plants are used generally on the Gulf and Eastern lines and the hardwoods on the entire system.

Special attention has been given by the Santa Fe to the distribution of hardwood ties, such as oak and gum, to insure that they are inserted where service conditions were most severe. Purchasing about a half million such ties annually, it is required that they be inserted (1) in Class A main tracks on curves of one degree or over and in Class B main tracks on curves of two degrees or over; (2) on engine leads and other important tracks in yards; (3) on sharp curves in industrial and side tracks; and (4) on short tangents between curves on mountain grades on heavy traffic main lines.

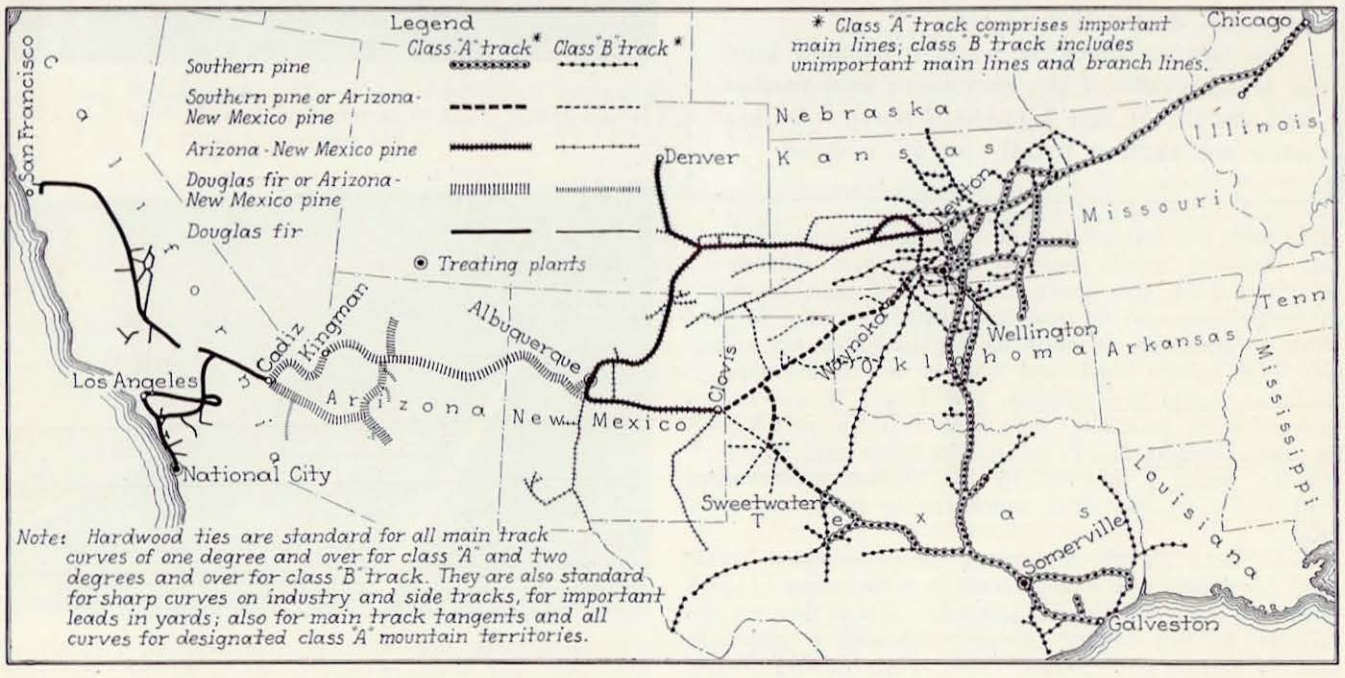
An instance of the manner in which the Santa Fe has adapted to its needs woods that were originally considered of little value is afforded by its experience with gum ties. Prior to 1908, gum ties were not regarded favorably because of the tendency of the wood to decay quickly during the seasoning period; yet experiments undertaken to determine whether this deterioration could be controlled proved that when certain precautions were taken, gum ties could be so seasoned and treated that they would render excellent service. For illustration, out of 13,000 treated gum ties that were installed in a test track at St. Johns, Kan., in 1910, only 469 have been removed after 24 years' service. Likewise, out of another group of 1,329 treated gum ties inserted in 1909, only 57 have been removed to date.

An interesting phase of the Santa Fe's search for woods suitable for crossties and available in sufficient quantities to justify consideration as a source of supply, centers around its experiments with foreign hardwoods. Interest in these woods was first evidenced by the road about 30 years ago when supplies of native hardwoods were being consumed at such a rapid rate that it was feared that a shortage was inevitable. As early as 1907, E. O. Faulkner, then manager of the tie and timber department of the Santa Fe, visited the Hawaiian and Philippine Islands, Japan, China, Australia, Manchuria and Korea, for the purpose of discovering possible supplies of timber for crossties. Later a second representative was sent to make a further study of the timber supplies of Hawaii, Japan, Mexico, Venezuela and Cuba.

Largely as a result of these investigations, 6,000,000 oak ties were imported from Japan between 1906 and 1912, and were installed untreated on the Coast lines because of the unusually long life without treatment of this wood in Japanese Railway tie service. With a view to determining the suitability and economy of Japanese oak as a permanent source of supply of timber for crossties, four test tracks were installed on the Coast lines, one each in 1910 and 1911 and two in 1912, in which the number of ties ranged from 28,000 to 45,000. The ties in these tracks were installed untreated and were removed because of failure in from 8 to 15 years. On the basis of these tests it was concluded that because of the short life obtained as compared with treated native timber, Japanese oak did not merit further consideration as a source of timber for crossties.

Extensive experiments were also conducted with Australian eucalyptus, more than 1,000,000 untreated eucalyptus ties being imported for insertion in test tracks and in regular service on the Western and Coast lines. Of the more than 250 varieties of eucalyptus, 13 were tested, the average life being slightly more than 10 years. An attempt to provide a domestic source of eucalyptus was made by the Santa Fe when, about 1908, it undertook the development of a large eucalyptus grove near San Diego, Cal. The growth of the trees, however, was not as rapid as expected and the grove did not develop into a practical proposition.

The Santa Fe's study of foreign woods also included

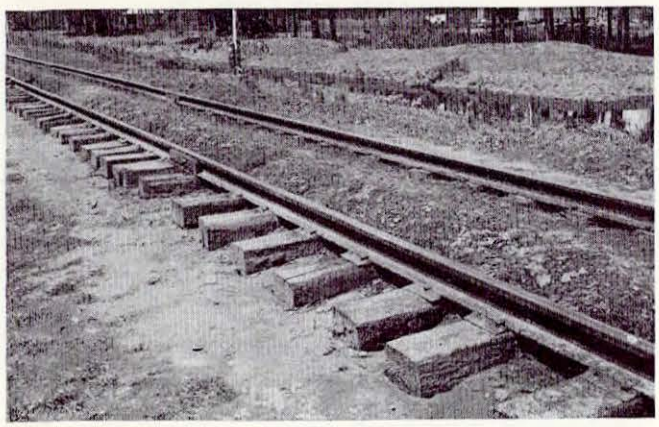


On the Santa Fe Different Species of Wood for Crossties Are Assigned to Those Portions of the System Where They Are Best Adapted to Use with Respect to Availability and Climatic and Service Conditions. This Map Shows How the Different Woods Are Distributed Over the System

an investigation of Ohia wood from Hawaii. Beginning in 1908, considerable quantities of Ohia ties were imported and installed at various points on the company's lines. These ties untreated have given an average life of slightly less than nine years. Because of this relatively short life and the further fact that the supply of this timber is limited, it was abandoned as a permanent source of tie timber.

First Test Commenced in 1902

Another essential phase of the Santa Fe's broad program of investigation of tie practices has been its test tracks, the first of which was installed in 1902. The purpose of the initial test tracks was to determine the relative economy of various woods untreated and treated with different preservative processes. Later, test installations were made for the purpose of ascertaining if it were possible, by treating softwood ties with creosote, to obtain a life of 14 years as that was the limit of the mechanical life then available. When the feasibility of doing this became apparent, and it had become evident that mechanical wear was the only deterrent to a still further increase in the life of ties, other tests were made to determine the effectiveness of various methods of protecting ties from such wear. Meanwhile, additional installations were made from time to time for the purpose of testing new treating processes or of determining the suitability of certain foreign woods. In the early years the work was of an exploratory nature while more recently efforts have been made more largely with a view to the perfection or refinement of established practices.



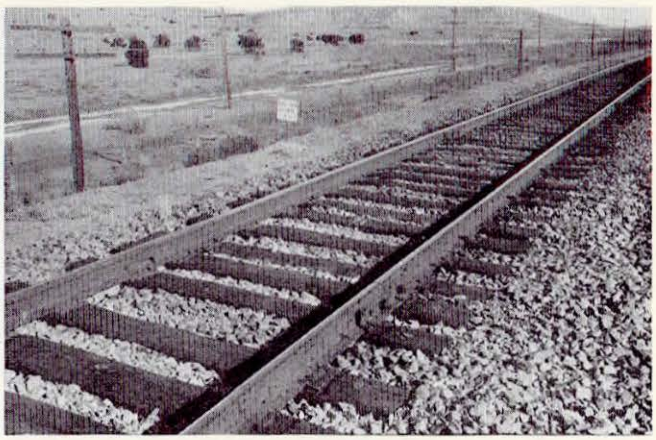
View of a Portion of the Cleveland (Tex.) Test Track. These Ties, Which Have Been in Service Nearly 11 Years, Are Hewn Texas Sap Pine Ties Treated with a Creosote-Petroleum Mixture by the Rueping Process

Types of Test Tracks

The tie test tracks on the Santa Fe may be divided into three general classifications as follows:

1. Those comprising complete section foreman's territories, generally one on each operating division.
2. Those known as the A.R.E.A. tests, the condition of which is reported periodically by the Committee on Wood Preservation of the American Railway Engineering Association.
3. Other tests inaugurated for specific purposes.

Those installations falling under the first classification total 26 in number and comprise in each case a section foreman's district as it existed in 1910, when these tests were first undertaken. In general, one of these sections is located on each operating division, although occasionally additional sections were established on certain divisions where it was desired to study special climatic or local conditions. At present there are under



Mixture-Treated Hewn Texas Pine Test Ties After Five Years in Track Near Acomita, N. M.

observation in these tests, 543,740 ties in main tracks and 54,509 ties in side tracks, a total of approximately 600,000 ties. Including the ties that have been removed and those still in the track, these tests have involved the study of a total of 1,167,489 main track and 88,529 side track ties. These tests embrace 165.3 miles of main tracks and 19.5 miles of side tracks.

These test installations are perpetual in nature and careful records are kept of each new tie inserted, these data including the kind of wood, whether the tie is hewn or sawed, the method of treatment and the date of insertion. When the ties in these sections reach the limit of their service life, they are removed by the track forces and are preserved so that they may be inspected and the cause of failure determined by an inspector from the office of the manager of treating plants. When information is desired concerning new woods or methods of treatment, ties embodying the new features are inserted in these test tracks as renewals are needed; otherwise, replacements are made with ties already in stock.

A.R.E.A. Test Tracks

The A.R.E.A. test installations differ from those in the first classification in two important respects: (1) No attempt is made to follow up the ties that are laid in replacements; and (2) they are composed largely of out-of-face installations of varying lengths that have been established from time to time as new lines or additional tracks have been constructed. These tests, which range in length from short stretches to a test embracing 90 miles of line between Texico, N. M., and Lubbock, Tex., comprise at present 481,222 ties in 181.5 miles of main tracks. To date a total of 579,660 ties have been reported on in these tests. In 1934, the Committee on Wood Preservation of the A.R.E.A. reported on the status of 100 different test tie installations on the Santa Fe.

Under the third classification the road has 13 tests now in progress, including 7 test sections of foreign woods—3 of eucalyptus ties and 4 of Japanese oak ties.

Two men on the staff of the manager of treating plants devote their entire time to the inspection of the various test tie sections, while the manager of treating plants and others make special inspections of the test tracks as the occasion arises.

One of the outstanding test tracks is that at Kingman, Ariz., in an arid region, where the ties are arranged in units of 100, each unit embodying ties of the same wood and preservative treatment and each wood being tested with 10 different treatments. To eliminate the loss of ties and the resulting interference

with the records due to possible mechanical destruction resulting from derailments, broken brake beams, etc., this installation was arranged in two identical test tracks, each approximately 6 miles long and 10 miles apart. To date 36,945 ties have been studied in the Kingman test track, of which 32,643 are still in track. The Kingman test also includes some 2,400 hardwood ties of different woods treated in different manners and with different preservatives and inserted in lots of 100 in some 4,000 ft. of curved tracks to determine the relative merits of these various woods and treatments under curve service. This entire installation at Kingman was made in 1922 in connection with the construction of second track.

The Treating Plant of the Santa Fe at Somerville, Tex.

Another duplicate installation employing the same arrangement of the ties as at Kingman was established near Eldorado, Kan., in 1923 in connection with the construction of a new line. In the Eldorado test track, which is 8.2 miles long, the same woods and treatments are being studied as at Kingman, except that ties treated with zinc chloride were not installed as the railroad already had ample data on the effectiveness of this treatment under climatic conditions comparable with those at Eldorado, where the rainfall is considerably heavier than at Kingman. To date 27,156 ties in the Eldorado test section have gone into the records, 26,587 of which are still in track.

The oldest and probably the most widely known test installation on the Santa Fe is located at Cleveland, Tex., on the Gulf, Colorado & Santa Fe in an area of heavy rainfall (50 to 56 in. annually) and warm humid climate. This installation was established in 1902 to compare treated with untreated ties, and now has developed into a test of various kinds of woods and treatments. Numerous ties embodying special forms of treatment have been installed here for observation. From this installation, which is 6 miles long, a total of 55,717 ties have gone into the records, of which 21,966 are still in the track.

Preservatives Also Studied

Before the turn of the century the favorite crosstie preservative on the Santa Fe was zinc chloride, applied either alone by Burnettizing or in combination with tannin and glue by the Wellhouse method. Creosote was still a relatively expensive product and the use of this preservative alone in sufficient quantities to obtain the desired results was deemed too costly. However, the use of creosote in conjunction with zinc chloride was considered to have possibilities and when the Cleveland test track was established in 1902, this was one of the combinations of preservatives to be tested, being applied to the test ties by both the open tank and the Allardyce processes. Other preservatives and preservative processes regarding which information was sought in this test included Burnettizing, the Wellhouse process, Barshall salts, Beaumont crude oil, Beaumont oil and zinc chloride in combination, Spiritine, Bakersfield crude oil and Diamond glue. The woods that were treated with these preservatives included eight varieties of oak, six varieties of pine, beech, hemlock, tamarack and gum.

Ties embracing most of these varieties were also installed untreated.

About 1903, the attention of the Santa Fe was directed to the Rueping method of applying creosote to timber, which, because it required a smaller amount of creosote than had previously been thought feasible to use, brought the cost of creosoting down to a level where the use of this preservative on a broader scale was justified. As a consequence, the railroad began experimenting with this treatment in 1904, and during the next few years installed in experimental tracks many ties treated by this process. As these tests indicated the superiority of the Rueping process, creosote was employed as the principal means of treating ties on the Santa Fe until supplanted by the creosote-petroleum mixture treatment in 1923.

Experiments with Crude Oil

Because of its low cost and availability to the Santa Fe, exhaustive tests were made to ascertain the effectiveness of crude oil as a timber preservative and various oils were tested to determine their relative properties. As previously noted, the initial tests with various crude oils were begun in 1902 in the Cleveland test track. Additional tests of this nature were installed from time to time and during the years 1908-14, a total of 1,830,000 ties, mostly hewn, were treated with crude oil. While these tests developed the fact that some crude oils, notably Bakersfield, gave better results than others, they proved conclusively that, owing to its lack of toxicity, crude oil, when used alone, is not satisfactory as an inhibitor of decay in wood.

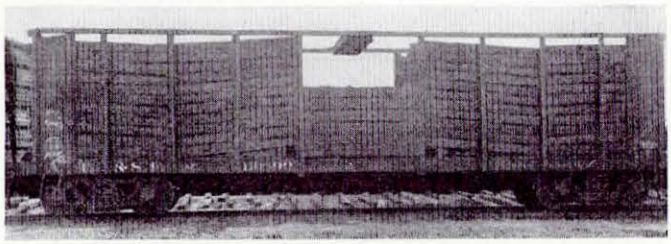
Subsequent experiments proved, however, that crude oil has a definite function when used in combination with creosote. On its western lines, particularly in the arid areas, the road found that ties treated with creosote, and especially with zinc chloride, were checking badly and were failing through shattering, even though entirely free from decay. Because ties treated with petroleum had been found to be remarkably free from checking, the idea was conceived of mixing petroleum with the creosote. Accordingly, during the years 1909-11, 300,000 ties were treated with a mixture consisting of 30 per cent creosote and 70 per cent petroleum, 10 lb. to 12 lb. of this mixture being applied per cubic foot of wood. In 1912-14, an additional 685,000 ties were treated with 7 lb. per cu. ft. of a 50-50 mixture. All these mixture-treated ties were placed in track on the Pecos, Slaton and New Mexico divisions of the Western lines.

Meanwhile, in 1912-13, 815 mixture-treated ties were inserted for observation in the Cleveland test track. In the mixtures used in this test, the proportion of creosote to petroleum was varied from 1:2 to 1:4 and, in addition, various amounts of the different mixtures were employed. Notwithstanding the wide range in the proportions of creosote and petroleum used, and the very small retention of the mixture in some of the ties, it was found that an average life of more than 20 years was being secured from these ties. Another phase of this test involved the use of petroleum from various sources to determine which produced the best results.

After observing the condition of the mixture-treated

ties on the western lines as well as those in the Cleveland test track, the road adopted as standard practice in 1923 a 7-lb. treatment with a mixture of 70 per cent creosote and 30 per cent petroleum at the Somerville plant and a 50-50 creosote-petroleum mixture at Albuquerque. A year later, this treatment was increased to 8 lb. of a 50-50 creosote-petroleum mixture at the Somerville and Wellington treating plants (the latter in 1930) and a 45-55 mixture at the Albuquerque and National City plants, which mixtures comprise the present standard practice of the road. At the time the mixture treatment was first chosen as standard, the Santa Fe was using a 5-lb. treatment with straight creosote.

The adoption of the 8-lb. treatment was based on the experiments with various treatments, which indicated that while good service was being obtained from the 5-lb. treatment, it did not insure complete penetration of the sapwood in ties having a large percentage of sapwood. Furthermore, as compared with the 5-lb. straight creosote treatment, the use of the standard 8-lb. mixture



Ties Are Carefully Loaded in Specially-Constructed Cars for Shipment to the Treating Plants

treatments has resulted in savings up to 4 cents per tie in the cost of treatment. The mixture treatment, moreover, has been found to render the ties more resistant to checking and shattering, this feature being of particular value in the warm dry regions.

Precautions During Seasoning

Recognizing very early in its studies that the best of treatment could not be expected to make good deficiencies in the production or seasoning of its ties, the Santa Fe has long been exacting in its requirements in this respect. As to dimensions, the road has insisted on well-made ties of full dimensions.

The railway is equally inflexible in its attitude towards decay. It requires that ties be brought to the right of way promptly after cutting, that they be stacked there in such a way as to promote the free circulation of air and with the bottom layer at least six inches off the ground. All ties which have stood on their ends on the ground are rejected.

The road removes all these ties from the right of way to carefully prepared and supervised seasoning yards at the treating plants within 30 days after their cutting, to insure freedom from contamination of forest decay. To insure availability of cars, the Santa Fe built 400 special cars which are confined to this service. The seasoning yards are laid out and maintained to promote seasoning under most favorable conditions. As a further precaution and in order to avoid the expense of treating ties that have already started interior decay, the Santa Fe has followed the practice for many years when machining ties, of sawing ½ in. off the ends of all ties other than of Douglas fir before treatment for the purpose of detecting any interior decay that may be present. The number of ties in which internal decay is detected in this manner averages about one-half of one per cent for the three plants at which the practice is followed, this average varying with the seasons and the years.

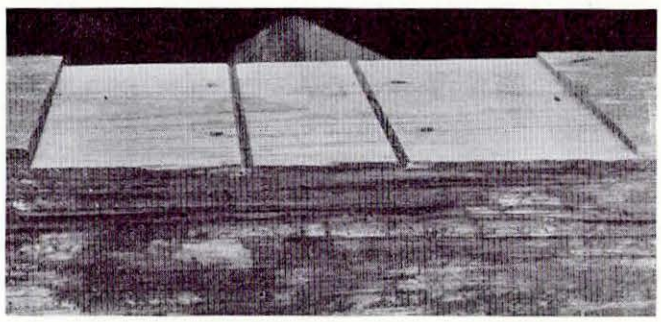
All ties showing advanced decay are thrown out, while those showing very slight heart rot or sap rot are designated as "X"-ties and are treated separately for use in side tracks. By these measures, the loss of timber during the period of seasoning is reduced to the minimum, waste of preservative resulting from the treatment of ties with interior decay is avoided and the integrity of the records of tie life is assured.

Mechanical Protection of Ties

With the objective of obtaining a mechanical life of ties equivalent to that which could be produced by inhibiting decay through preservative treatment, the Santa Fe, since the early days of its crosstie investigations, has also studied various devices for preventing destruction of ties due to such mechanical causes as spike killing and rail cutting. Prior to 1910, tie plates had been studied intensively as a tie protection device and in that year instructions were issued to the effect that all new ties, whether treated or untreated, must be protected with plates.

In 1907, extensive tests were undertaken to determine the economy and effectiveness of the screw spike as a means of preventing spike killing and by 1917, the road had equipped 375 miles of track with screw spikes. However, while these spikes proved effective in preventing failure of the wood around the spike hole, the high initial cost of application prevented their adoption on a large scale and in recent years they have been used only in limited quantities.

Another device that was studied as a means of inhibiting spike killing in softwood ties was the dowel, a screw plug of treated hardwood, which was screwed into the tie to receive the spike. By inserting these dowels in softwood ties, such as redwood, which is available in quantities in California, and in pine, it was felt that spike killing would be prevented, thus making is possible to take advantage of the long life that could be obtained from these woods. As an experiment, in 1910, dowels were applied to about 15,000 ties for screw spikes. So satisfactory were the results of this initial test that about five years later an additional 200,000



View of a Tie That Has Been Adzed and Bored Before Treatment in Accordance with Standard Practice on the Santa Fe

treated dowels were applied in loblolly pine, redwood and cedar ties. Further experience with these dowels, however, developed difficulty in regaging track and for this reason and also because of the relatively high cost of their application, they, too, were discarded. Experiments on a smaller scale were conducted with steel sockets but as these were not effective in holding the track to gage and did not permit the track to be regaged, they were discarded as impractical.

At present the effects of spike killing, which to a large extent is due to the tearing of the wood during the driving of the spike and to later decay of the wood around the spike hole, is minimized by the practice of

boring holes for the spikes before the tie is treated. In this way the tearing of the wood fibers is largely avoided and the wood in the vicinity of the spike hole is impregnated with the preservative to the full depth of the hole, with the result that there is no opening in the treated surface of the timber through which decay may gain a foothold. The ties are also adzed before treatment to provide uniform rail bearing, this operation since 1927 including the cutting of V-shaped grooves in the surface of the tie to receive two corresponding transverse ribs in the bottom of the tie plate, the road having just re-equipped its treating plants with new modern adzing and boring machines incorporating an especially designed unit to groove the ties.

Having gone to such great lengths to prepare its ties for service, the Santa Fe is no less insistent on the distribution of these ties to those locations where they will give the best service. Beginning in 1922, as a result of a study of the subject by a committee appointed for the purpose by the vice-president, of which the chief engineer system, was chairman, all ties are distributed and inserted according to a specific plan, which assigns to each section of track that timber and that treatment which will render the longest service. In other words, the plan is all-inclusive, carrying the tie from the woods to its insertion in the track.

It is an axiom on the Santa Fe that it is not sufficient to select timber carefully and to apply the most effective preservative treatment, but that it is also important that the tie be protected against abuse and improper handling after treatment. To this end, men from the staff of the system manager of treating plants, experienced in the treatment and care of timber, visit the larger surfacing and rail laying gangs from time to time to cooperate with these gangs in seeing that the work is conducted in such a manner as to reduce damage to the ties to the minimum. Another practice designed to insure that the maximum life of ties will be obtained involves the inspection of ties that have been removed from the track with a view to determining causes of failure of each kind of wood and treatment and to make sure that ties have not been taken out prematurely. While it is not possible to inspect all ties that are removed, an effort is made to see as many as possible.

It is through years of investigation of the behavior of more than 2,000,000 ties subject to system-wide conditions that the sequential steps have been evolved in the Santa Fe's practices, including (a) the selection of those woods best adapted to its climatic and traffic conditions, (b) the cutting and seasoning of ties cut from these woods to avoid exposure to early decay, (c) the treatment of these ties to give them immunity against agencies of decay and (d) the protection of these ties against undue mechanical destruction through pre-adzing and boring, the universal use of tie plates and the elimination of unnecssary destruction in rail laying and other track operations. This painstaking and highly ramified investigation constitutes an epic in railway research that, although still in progress, is saving millions of dollars annually for the Santa Fe and hundreds of millions of dollars each year for the railways as a whole.

Since the Santa Fe first began to treat its ties, the research work described above has been directed successively by three men. These include the late Edwin O. Faulkner, who served as manager of the tie and timber department from 1897 to 1918. A pioneer in the application of timber preservation, Mr. Faulkner was responsible for the introduction of the Rueping process for treating ties. Following Mr. Faulkner was George E. Rex, who, as manager of treating plants from 1909 to 1920, was actively in charge of the tie investigation work during this period. Since 1920, this work has been under the direction of R. S. Belcher, present manager of treating plants, who has done much to crystallize the results of earlier investigations and to evolve standard practices therefrom.

In this work of developing standard practices for the preparation, care and use of crossties, the manager of treating plants has worked under the supervision of the chief engineer system, who is responsible for the specification and treatment of all timber for maintenance of way and construction uses.

Freight Car Loading

WASHINGTON, D. C.

REVENUE freight car loading for the week ended September 5 totaled 764,680 cars, an increase of 10,938 cars or 1.5 per cent above the previous week which it supplants as the 1936 peak to date. This first week in September did not this year include the Labor Day holiday as was the case in 1935 and 1934 when loadings were less respectively by 172,739 cars and 200,797 cars. Loadings of coal and forest products showed reductions as compared with the previous week while loadings of grain and grain products were under both the previous week and the corresponding week of 1935. Loadings of miscellaneous freight were 11,316 cars above the previous week. The summary, as compiled by the Car Service Division of the Association of American Railroads, follows:

Revenue Freight Car Loading

For Week Ended Saturday, September 5

Districts	1936	1935	1934
Eastern	155,468	115,824	114,047
Allegheny	155,309	107,384	101,040
Pocahontas	53,360	43,289	37,696
Southern	104,834	85,650	77,319
Northwestern	122,103	99,618	88,059
Central Western	112,968	92,537	93,236
Southwestern	60,638	47,639	52,486
Total Western Districts	295,709	239,794	233,781
Total All Roads	764,680	591,941	563,883
Commodities			
Grain and Grain Products	32,679	36,649	31,933
Live Stock	16,952	15,095	35,850
Coal	130,167	110,646	101,089
Coke	9,796	5,947	5,127
Forest Products	34,344	26,877	19,529
Ore	56,098	31,840	23,160
Merchandise L.C.L.	171,870	139,972	141,212
Miscellaneous	312,774	224,915	205,983
September 5	764,680	591,941	563,883
August 29	753,742	680,848	647,531
August 22	734,973	625,774	606,917
August 15	736,497	614,005	601,788
August 8	728,293	582,077	603,968
Cumulative Total, 36 Weeks	23,882,153	21,075,543	21,424,385

Car Loading in Canada

Car loadings in Canada for the week ended September 5 amounted to 58,512 cars, as against 44,720 cars for the corresponding week last year and 55,641 cars for the previous week, according to the compilation of the Dominion Bureau of Statistics. The index number rose to 91.57, a new high point since 1931.

	Total Cars Loaded	Total Cars Rec'd from Connections
Total for Canada:		
September 5, 1936	58,512	22,083
August 29, 1936	55,641	21,078
August 22, 1936	52,477	21,271
September 7, 1935	44,720	16,632
Cumulative Totals for Canada:		
September 5, 1936	1,616,617	827,455
September 7, 1935	1,550,611	761,419
September 8, 1934	1,543,489	790,246

The Seaboard Air Line Diesel-Electric Mail-Baggage Car with 600-Hp. Electro-Motive Power Plant

Seaboard Air Line Installs Diesel-Powered Rail Car

Mail-baggage-power-unit built by Electro-Motive for use with standard passenger equipment is powered by 600-hp. engine and weighs 186,400 lb.

THE Seaboard Air Line recently placed in service a Diesel-electric rail car designed as a mail-baggage-power-unit to be used with standard passenger equipment as trailers. The car was built for the Seaboard by the Electro-Motive Company at the St. Louis Car Company's plant and is powered with an Electro-Motive unified power plant consisting of an eight-cylinder, two-cycle Diesel engine, developing 600 hp. at 750 r.p.m. The total weight of the car with 25,000 lb. of baggage and 5,000 lb. of mail is 186,400 lb.

The underframe is of the built-up type constructed entirely of Man-Ten steel, completely welded, having center-sills made up of 9-in., 13.4-lb. channels, with a $\frac{3}{16}$-in. top cover plate and a $\frac{1}{4}$-in. bottom cover plate. The side sills consist of 5-in. by 3-in. by $\frac{5}{16}$-in. angles with pressed-steel cross-members. The front body bolster under the power plant is built up from $\frac{3}{8}$-in. plate, welded.

The superstructure is of the conventional mail-baggage interior design and is constructed of Cor-Ten and Man-Ten, riveted and welded, the side sheets being 12-gage steel with 16-gage roof sheets. The roof is of the oval type without clerestory. The inside lining in the mail compartment is 22-gage steel at the sides with .04-in. aluminum sheet for the roof sheets. The inside side lining in the baggage compartment is 22-gage corrugated steel. Light-weight Salamander insulation 1-in. thick is used in the side walls of the baggage room and 1½ in. thick insulation in the mail room. The same thicknesses of Salamander insulation are used in the roof.

The engine room and operator's compartment occupies a space 23-ft. 2-in. long at the head end of the car. In the center is the mail compartment, which is 15 ft. 1 in. long, and at the rear end the baggage compartment, which is 33 ft. 9 in. long. The total length over the car body is 72 ft. 0 in. The car is skirted at the sides to cover the equipment and the pilot is entirely covered and forms a continuation of the front of the car.

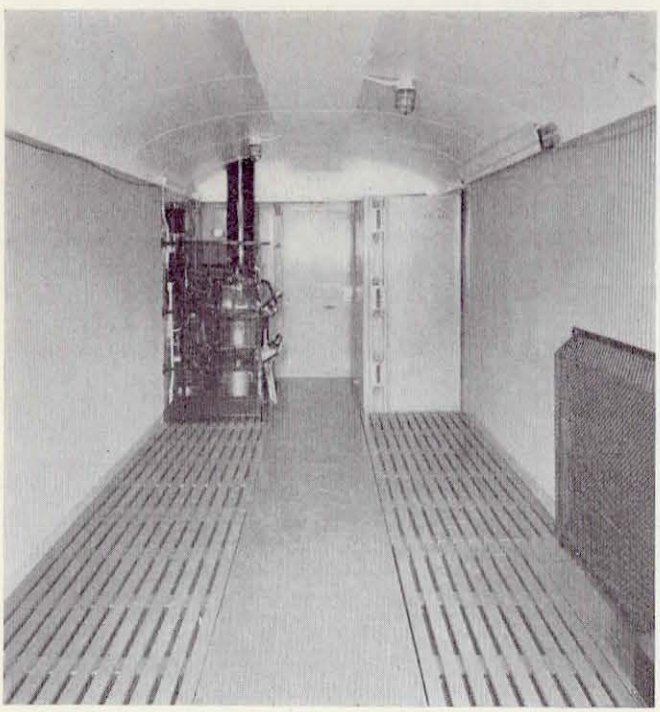
The car is carried on two four-wheel trucks having cast-steel side frames and bolsters furnished by the General Steel Castings Corporation, and with clasp brakes having the brake cylinders mounted on the truck side frames. The truck centers are 51 ft. 0 in., with a truck wheel base at the rear of 6 ft. 6 in. and at the front of 8 ft. 0 in. The journals are 5½ in. by 10 in. on the rear truck and are 6 in. by 11 in. on the front truck under the power plant. A. A. R. standard bearings and 36-in. wheels are used on both trucks.

Alloy steels have been used in the framing of this car to reduce the weight to a minimum in keeping with

Front End of the Seaboard Diesel-Electric Car

the required strength. Aluminum is used for sash and headlining and all windows in the operator's compartment are glazed with ¼-in. safety plate glass. All of the side doors are steel, of the flush sliding type, except the cab entrance which is hinged. The usual roof ventilators have not been used on this car, thereby keeping the roof free from unsightly projections. The ventilation is furnished by an overhead duct system with an exhaust fan, motor driven, at the rear end of the car.

The heating plant is located at the rear end of the baggage compartment and consists of a Vapor-Clarkson steam-heating boiler. The air brakes are the New York No. 6 ET.



The Baggage Compartment, Looking Toward the Rear, Showing the Oil-Fired Heating Boiler and Water Tanks

Power Plant and Controls

The prime mover of the Electro-Motive Unified power plant is an eight-cylinder Diesel engine having an 8-in. bore and 10-in. stroke and developing 600 hp. at 750 r.p.m. Power for all auxiliaries, whether driven directly or indirectly, is taken from the engine in excess of this rating. The cylinder block and crank case of the engine are combined into a single-unit by means of welded steel construction.

The power produced by the prime mover is delivered to the driving wheels through an electrical transmission consisting of generator, traction motors, and PCL control apparatus. This equipment is supplemented by a storage battery and an auxiliary battery charging generator. All of this equipment has been especially designed for the Winton Model 201A Diesel engine, to form a unified oil-electric power plant.

Forced ventilation of the two traction motors is provided from the engine compartment through flexible ducts between the motors and car underframe structure.

The controls for the power plant have been incorporated in a single control station located slightly forward and on the left hand of the operator's seat. The control station consists of a hand throttle for the main engine; an auxiliary throttle for engine shut-down; engineman's master control; a switch bank with individual fuses for the control of head classifications and gage lights, exciter field, master control and engine starting switches.

Lessons from Storekeeping for Railway Electrification*

By J. L. Daschback†

IN 1895, the Baltimore & Ohio pioneered in the use of power other than steam for the operation of trains when it electrified its Baltimore tunnel at 600 volts direct current. With this beginning, the operation of other tunnels, terminals, interurban lines and sections of main lines were electrified, until in January, 1935, the Pennsylvania inaugurated complete electrification from New York to Washington, D. C., using 11,000 volts alternating current. Since then, steam power has been further supplemented by gas-electric and oil-electric power and by highway passenger buses and trucks. We may reasonably expect these changes to continue in an ever-widening field.

Thus far, electrification projects have followed no set standard. They differ as to current, trolley voltage, trolley lines, type of motors, controllers, switches and other electrical apparatus used. Up to the present, practically each new installation differed from those preceding it. It will be some time before we have definite recognized standards in this field. The same conditions undoubtedly prevail in the field of gas-electric and oil-electric equipment.

Each manufacturer may be regarded as having a close control over the materials in his particular field. As a result, the purchasing department is obliged to buy in a closed market at prices which include costs of research,

* From a paper awarded honorable mention in the annual best paper contest of the Purchases and Stores Division, A.A.R.

† Assistant Storekeeper, Great Northern, Spokane, Wash.

experimentation, patent royalties, etc., with final costs far in excess of the actual value.

Complete Spare Parts Unnecessary

Because of the experimental nature of such equipment, there is no basis from which to figure its reliability. As a consequence, manufacturers, in order to insure continuity of service, recommend the stocking of complete spare units and major items of maintenance material far in excess of actual requirements, and railroad maintenance and operating officers are eager to follow factory recommendations. That is fine for the manufacturer—but it is expensive for the railroad. It ties up a lot of money in material which does not move and which, by reason of its experimental nature, becomes obsolete.

The writer, with 25 years experience on a 6,600-volt alternating current interurban freight and passenger railroad,* would much prefer to allow actual operating experience to govern the purchase of expensive electrification material unless operating conditions are such that "out of service" equipment means a greater expense to the company than the tying up of a huge sum of money in replacement parts. Even in such cases, parts should be stocked only after carefully considering losses caused by holding equipment for repairs, source of supply, whether stocked at the factory or made special, period of delivery, original cost, cost of storage, and probable obsolescence.

Steam locomotives, being self-contained, require constant servicing for water and fuel, also frequent inspection and maintenance to insure availability for service. In comparison, electric locomotives are not self-contained but derive their power from a central source. As a result, they are available for immediate service whenever desired, without servicing for water, fuel and initial firing. Electric locomotives can operate continuously for indefinite periods without attention of any kind. Many of the present day electric locomotives are making more than 10,000 miles a month, which means that they are in practically constant service.

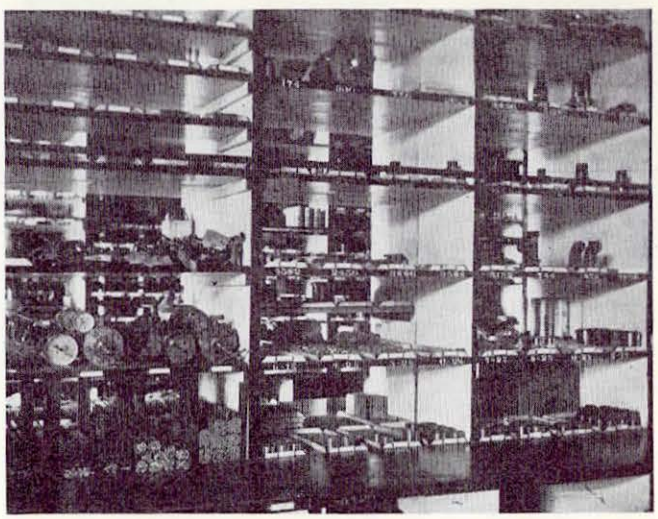
Running Repairs Light

Such inspections as are necessary are fully cared for in a few hours. The day-to-day costs for maintenance are very light. Running repairs require principally that all of the various pieces of electrical apparatus be kept free from grit and dirt of any kind that will ground the current. Carbon brushes for motors must be checked frequently and short or broken brushes replaced. Proper pressure must be maintained on the brushholders. Controllers, control circuits and switches must be inspected for renewal of contact fingers and switch contacts, all main connections tightened, the bearings oiled, and other minor parts renewed. The inspection must include air brake valves, trolley contacts and the air compressors which supply the air for braking power and the operation of electro-pneumatic switches.

Where running repair inspections are cared for properly and where the tonnage hauled is kept within the limits prescribed for the particular type of motor, heavy repairs are necessary only after years of service. Heavy or expensive repairs apply principally to the traction motors and to the control circuits. In the case of motors, heavy repairs means complete re-insulation. This requires stripping of all the parts down to the iron core of the frame. It is estimated that the insulation life of such equipment will average from 9 to 12 years, depending on the service performed. The insulation will deteriorate in that time to the extent that it must be renewed to insure reliability. Theoretically, then, we can assume that a new motor or one completely re-insulated will, if properly handled in service, require no heavy repairs for at least nine years. This does not work out exactly in practice but is close enough to warrant using such a period of time as a basis of performance.

Taken as a whole, maintenance costs of electric locomotives range from 50 per cent to 65 per cent of steam locomotives, but there are approximately 10 times the number of individual repair items on an electric locomotive. Consequently, if complete stocks were to be maintained, we would, theoretically, have a stock account at least 10 times higher than would be necessary in the case of steam locomotives; and the stock out-put would be only about 50 per cent of that prevailing for steam locomotive stocks. In other words, stocks would be greatly increased in total value and the turn-over of material would be cut approximately one-half. The stores department would carry the load. How heavy this added load would be will depend a great deal on what preliminary investigations are made to determine to what extent essential items are to be stocked.

Purchasing and stores departments should, therefore, approach the situation cautiously with a view to eliminating so far as possible the losses certain to develop without a well-planned and organized effort. The following are recommended:



Inside View of a Great Northern Storehouse

Discount or disregard entirely factory recommendations for stocking of parts, except for the smaller inexpensive items.

Permit actual operating experience to dictate what expensive items of material should be kept available.

Carry a generous supply of carbon brushes and brushholder repair items for motors, contact fingers, contacts, contact springs and other inexpensive items for control circuits, trolley contact material, etc.

Make a survey of all repair items necessary, distinguishing between those which are entirely special, those which can be obtained in a competitive market, and those which can readily be manufactured in the company's own plant. The non-special material will include all forms of insulation, brass bearings or castings of all kinds, brass or copper plates, wire cable, etc.

Employ, either in the mechanical department or in a reclaiming division of the store, competent electrical repair men capable of dismantling and re-insulating coils, bars, and all other forms of electrical apparatus, capable of manufacturing resistances, field coils, or repairing or rebuilding any and all forms of electrical apparatus.

*Spokane, Palouse & Northern.

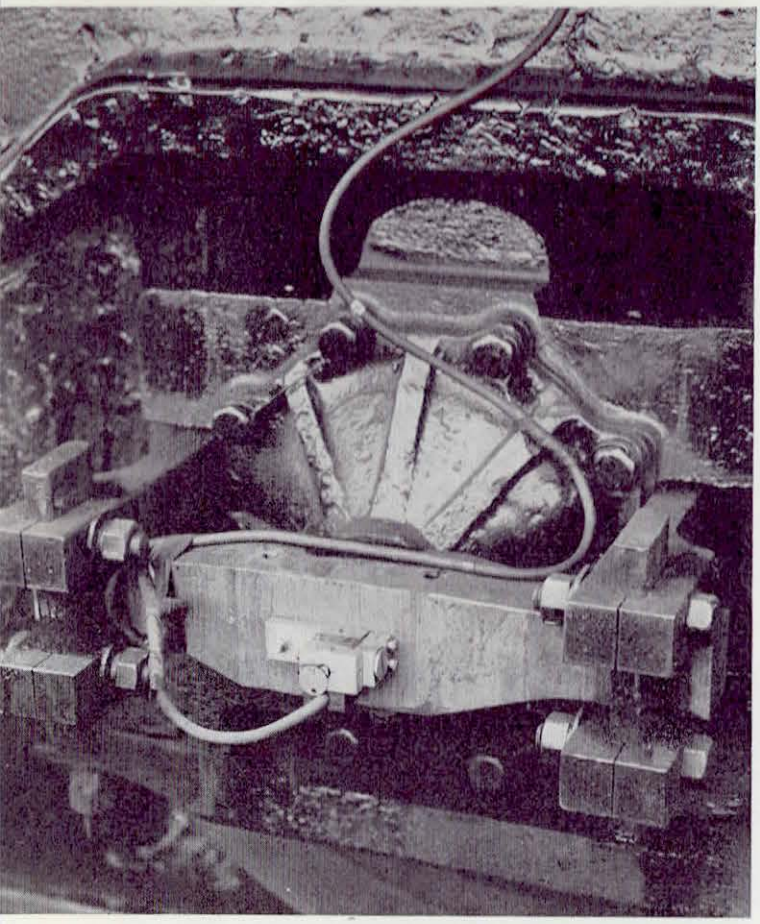


FIG. 1—Electro-Magnetic Strain Gage and Weigh-Bar Applied to End of Axle

Track Tests of Electric Locomotives

Electrical recording devices extend measurements of locomotive behavior to all track

TRACK tests made by the Pennsylvania on a special Brinell tie track for the purpose of selecting and modifying electric locomotive designs, were described in the *Railway Age* of September 12, 1936. The test track provided a means of determining lateral blows of locomotive wheels on the track and determined what speeds were permissible with each type of locomotive.

Some of the locomotives tested were equipped with strain gages which also measured the force of lateral blows and made it possible to extend the track tests to all track on the railroad. In addition the locomotives were equipped with instruments for measuring acceleration and relative movement between parts of the locomotive. The strain gage and movement and acceleration tests are described in this article.

Strain Gage Tests

Early in 1933, engineers of the General Electric Company applied strain gage recorders to each driving axle of the original class P5A locomotive and made test runs between Wilmington and New York to determine its performance under all main line track conditions. In 1934 these tests were repeated at higher speeds and were followed by similar tests made with the modified P5A locomotive and finally with the new R1 and GG1 locomotives.

Strain Gage Apparatus

The recorders measured the lateral forces acting on all the axles of the locomotives. The journal boxes were modified so that the force between each journal box and the locomotive frame was taken through a rigid "weigh bar" made of chrome nickel steel (See Fig. 1). The stresses in the weigh bars were measured by electro-magnetic strain gages recording on supersensitive oscillographs. A weigh bar was placed at each end of the axle, which was free to move between the two bars with the same clearance which it would normally have in the frame. The two strain gages corresponding to each axle were inter-connected electrically, so as to record on a single line on the oscillograph which deflected upwards if the force was toward the left rail and downwards if the force was toward the right rail.

The weigh bars and gages were calibrated statically in a testing machine for forces up to a maximum of 50,000 lb., and all gages were adjusted to have the same calibration, which greatly simplified the measurement of records. The gages were operated on 2,000-cycle current and laboratory tests showed that impacts lasting only $\frac{1}{2000}$ second were accurately recorded by the instruments.

The pressure records were free from any instrumental vibration, as shown by the records obtained on the R1 locomotive whose two middle driving axles had nearly 2 in. lateral clearance in the frame, and therefore exerted no lateral force on the frame except on moderately sharp curves. The four gages on these axles produced

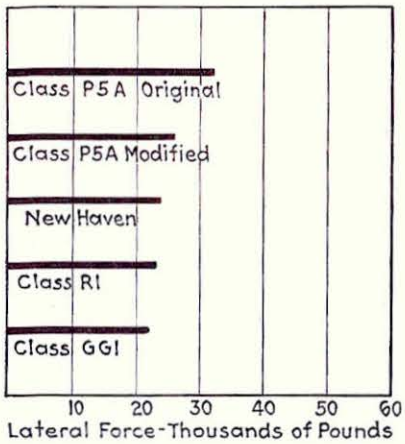


FIG. 2—Locomotives on Tangent Track at 90 M.P.H.

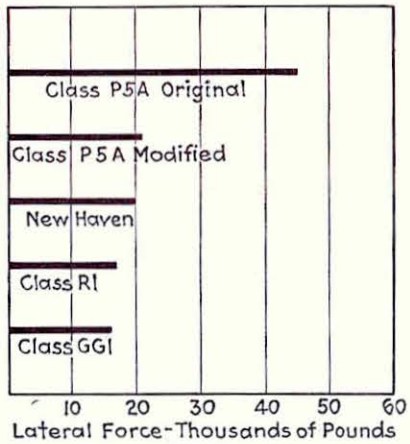


FIG. 3—Locomotives on Curved Track at 90 M.P.H.

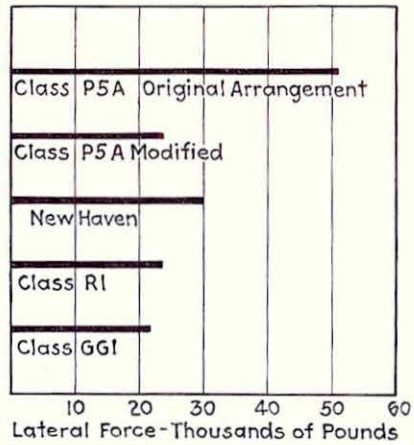


FIG. 4—Locomotives on Special Track at 90 M.P.H.

LATERAL THRUST MEASURED WITH STRAIN GAGES—VALUES SHOWN ARE ROOT MEAN SQUARE OF 10 HIGHEST BLOWS

smooth lines of zero force at all speeds up to 120 m.p.h., except on those curves where the clearance was completely taken up and normal records of force were obtained.

The scale chosen was approximately 1 in. to 30,000 lb. force which allowed complete simultaneous records on 10 axles to be taken on two oscillographs. Typical strain gage records are shown in Figs. 6, 7 and 8.

Results of Strain Gage Tests

Briefly, the strain gage tests showed that the original P5A locomotive might have exerted high lateral pressures, particularly from the front driver, both at rough spots on the track and on the outer rails of curves at speeds of approximately 90 m.p.h.

A modified P5A operated at 90 m.p.h. over sections of the same track which is approved for this speed and over short stretches at 100 m.p.h., showed that the modification of the locomotive had resulted in quick damping of the oscillations, eliminated the high blows from the front driver and reduced the general level of sustained blows considerably so that they approached those of the original locomotive at 70 m.p.h. Practically all of the highest blows recorded on the modified locomotive at high speed occurred at main line interlocking where the track is reinforced and therefore more rigid than normal.

Strain Gage Records

In the diagrams, Figs. 2, 3, and 4, is shown the root mean square of the ten highest blows from the strain gage readings on round trips between Wilmington and New York in which all of the locomotives are included. These diagrams are for tangent track, curves and interlocking. The locomotives maintain the same relation to each other in these diagrams, with the exception of the New Haven, which develops high lateral force at interlockings. That there has been a very considerable improvement in the modified P5A and in the new R1 and GG1 over the original P5A is evident.

In Fig. 5 the magnitude of the blows is plotted against frequency of occurrence as found on round trips between Wilmington and New York. This diagram is for all track conditions except low rail of curves and the points are the averages of two round trips between Wilmington and New York. It illustrates the characteristics of the various locomotives. The R1 and GG1 each exert 40 blows of 20,000 lb. (i.e. between 19,000 and 21,000) in the course of a round trip between Wilmington and New York over the sections at which the speed was 90 m.p.h.

The R1 locomotive shows more high blows and less low blows. The high blows are due to interlocking or rough track where the R1, due to its relative rigidity and stiff spring system, is at a disadvantage. The greater number of low blows produced by the articulated GG1 are due to the greater number of axles and to the more flexible springs. It is interesting to note that on curved track the articulated locomotive is exceptionally stable and not only are maximum blows low, but there are comparatively few blows even in the lower ranges.

The modified P5A locomotive is comparable with the R1 except that its greater axle load increases the effect of rough track, resulting in a greater number of high blows.

The strain gage records of the leading driver are shown in Fig. 6 for the original P5A and on the lower

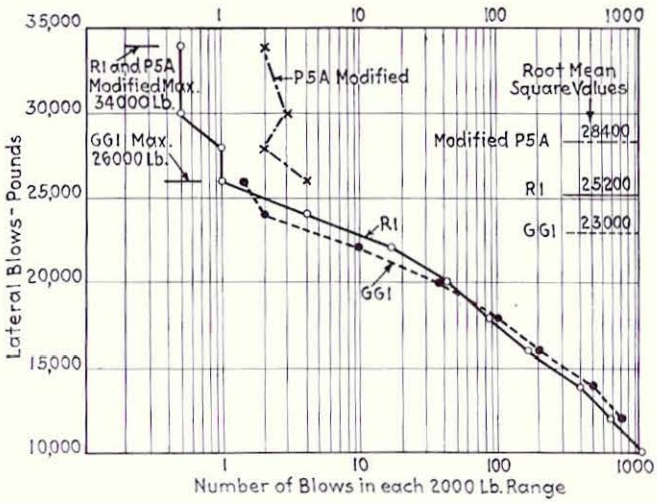


FIG. 5—Number of Lateral Blows as Measured by Strain Gages for All Locomotives and All Track Conditions Except Low Rail on Curves

half similar records for the modified P5A. The speed for both is 90 m.p.h. The high blows of the original P5A on the curve near Ridley Park are distinctly indicated, and again at Moore and south of Baldwin. For the modified P5A, shown in the lower section, these leading driver blows are almost entirely absent. The

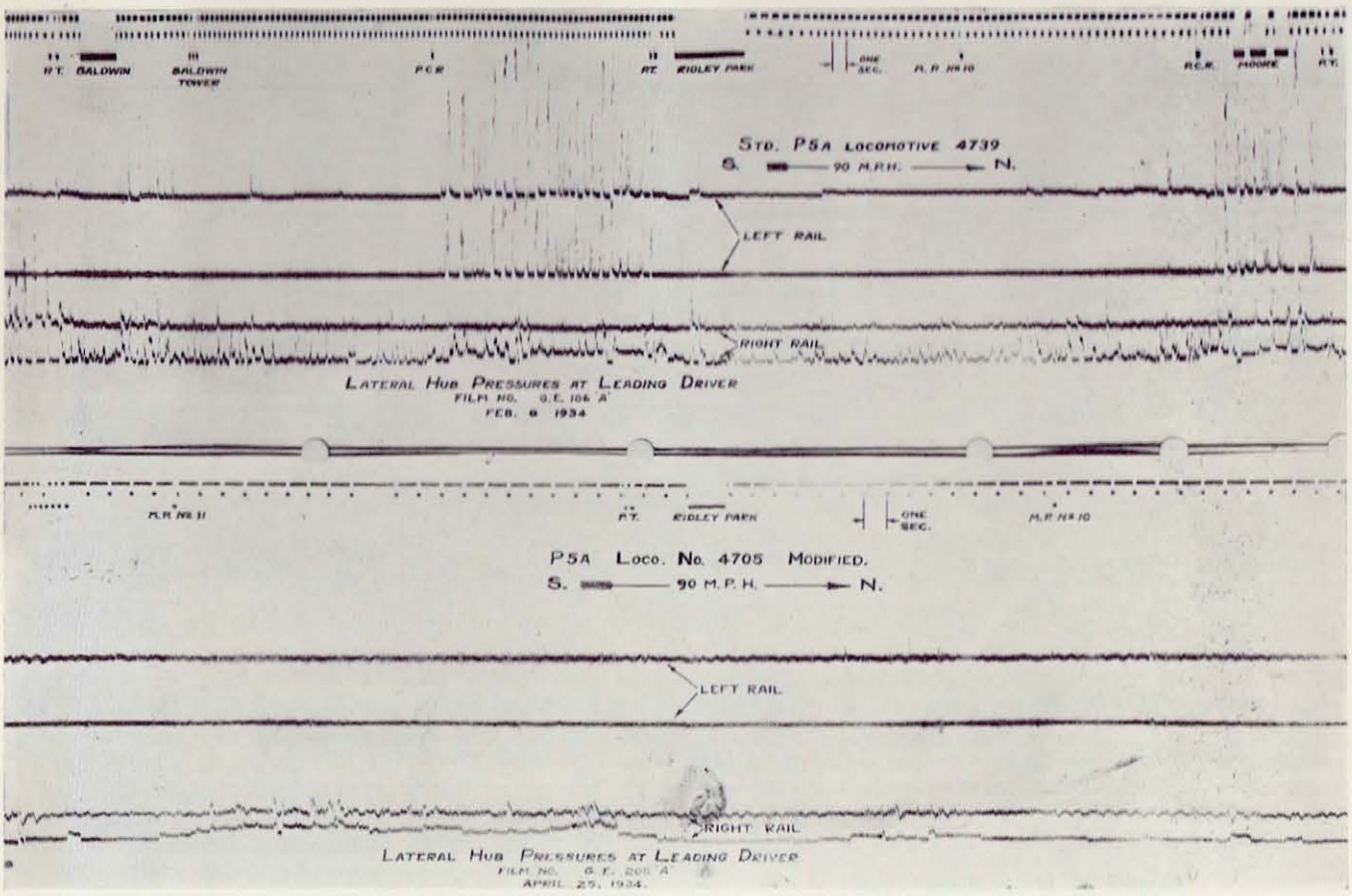


FIG. 6—Strain Gage Record for the Original and Modified P5A Locomotive Running at 90 M.P.H., between Baldwin and Moore on the Maryland Division (Above)

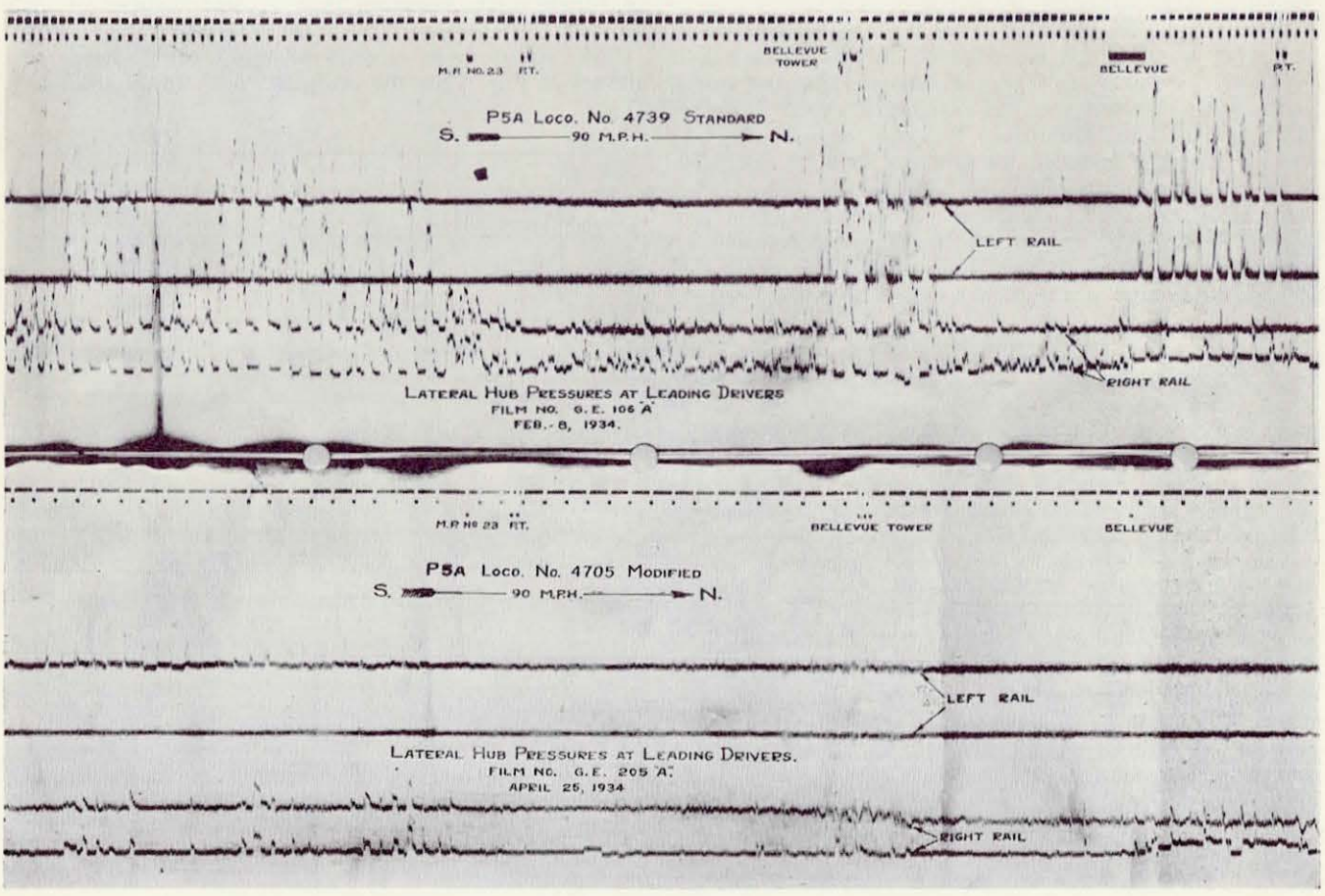


FIG. 7—Strain Gage Record for the Original and Modified P5A, Running at 90 M.P.H. South of Milepost 23 and over the Interlocking at the Bellevue Tower on the Maryland Division (Below)

two upper lines marked "Left Rail" indicate the forces in the two trunnion guides which hold a journal box in the frame. The sum of these two forces represents the total side thrust in the direction of the left rail.

In Fig. 7 the same comparisons are repeated for one of the most severe stretches of turnouts, at Bellevue Tower on No. 1 track at 90 m.p.h. The upper record shows that the original P5A oscillates heavily and continuously through the interlocking, producing heavy blows on the front drivers. The lower record shows that the modified engine oscillated to some extent, but that the blows were much lower and of shorter duration. These records also give a good idea of the improvement on curves north of Bellevue Station and south of mile post 23.

In Fig. 8 a record is shown for class GG1 locomotive at a speed of 115 m.p.h. over tangent track at mile post 118 and a curve of 1 deg. at Claymont. In this record the total side thrust on an axle is shown by a single line, blows on the left rail being indicated by upward deflections and blows on the right rail by downward deflections.

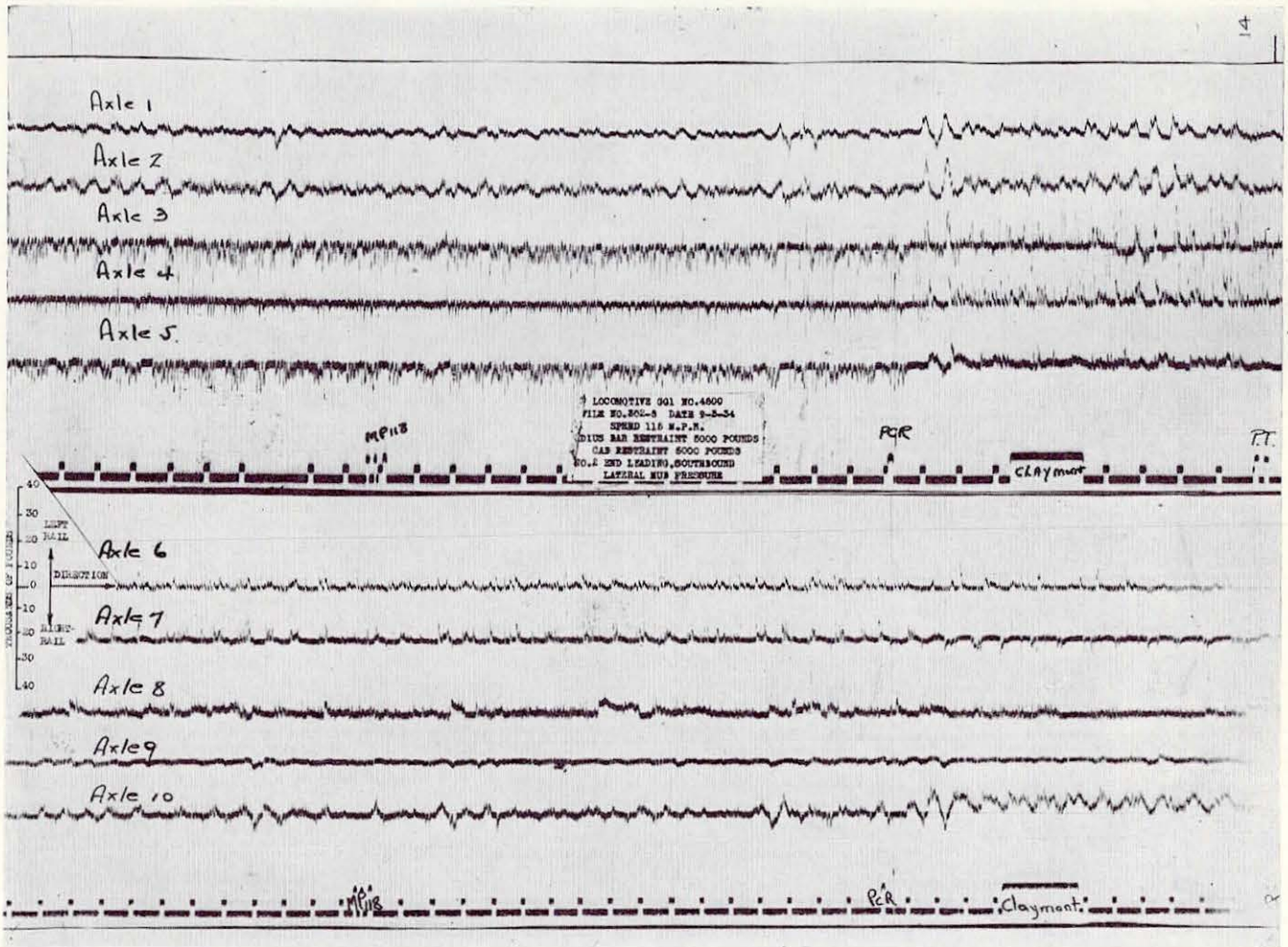


FIG. 8—Strain Gage Record for the Class GG1 Locomotive Running at a Speed of 115 M.P.H., near Claymont on the Maryland Division

Movement and Acceleration Tests

The engineers of the Westinghouse Electric & Manufacturing Company measured accelerations and relative motions at various points on the locomotives. The chief purpose of these tests was to study the action of the different parts of the locomotives in order to determine what changes if any, were needed in order to decrease the lateral flange pressures as measured by the Brinell track and the strain gages. The accelerometer consisted of a laminated armature mounted on a stiff cantilever spring and moving between two coils. Acceleration of the frame produces movement of the armature relative to the coils which changes the current flowing in the oscillograph element. Fig. 9 shows some of the instruments mounted on the locomotive.

The motion indicators consisted of a slide wire potentiometer, the arm of which was operated by a cable attached to the part the motion of which was to be measured. By means of electrical connections the motion indicator gave a record on an oscillograph. At times, it was required to measure sums or differences of two or more displacements. For example, the angularity of a guiding truck relative to the main frame was measured by the difference between the longitudinal displacements of the two sides of the truck.

The oscillographs and control apparatus were mounted in a test car which was coupled to the locomotive (See Fig. 11).

The measurements that were made on the locomotive included:

(1) Lateral acceleration at the front, center, and rear of the cab, and on the axle.
(2) Vertical acceleration on the cab and axles.
(3) Truck bolster swing.

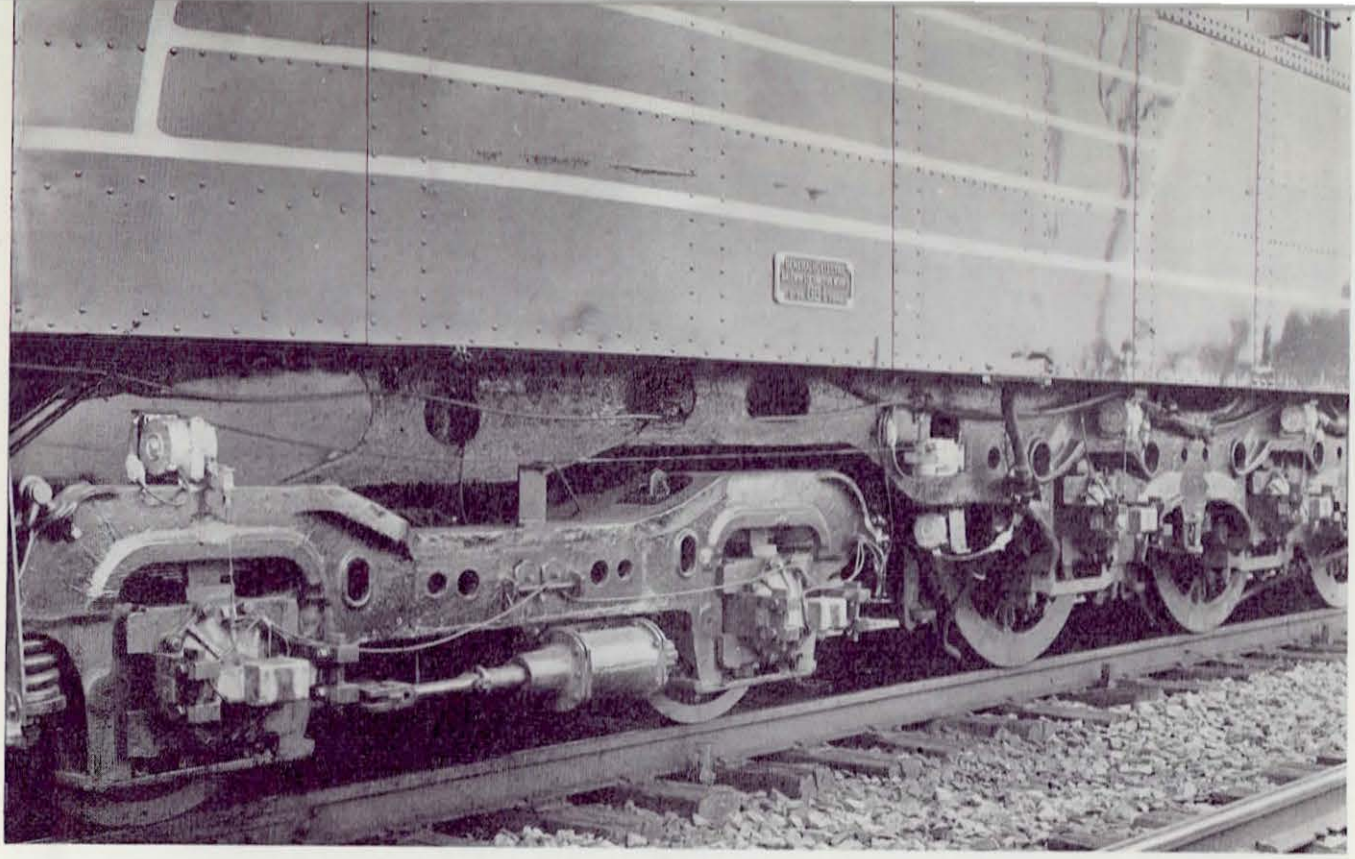
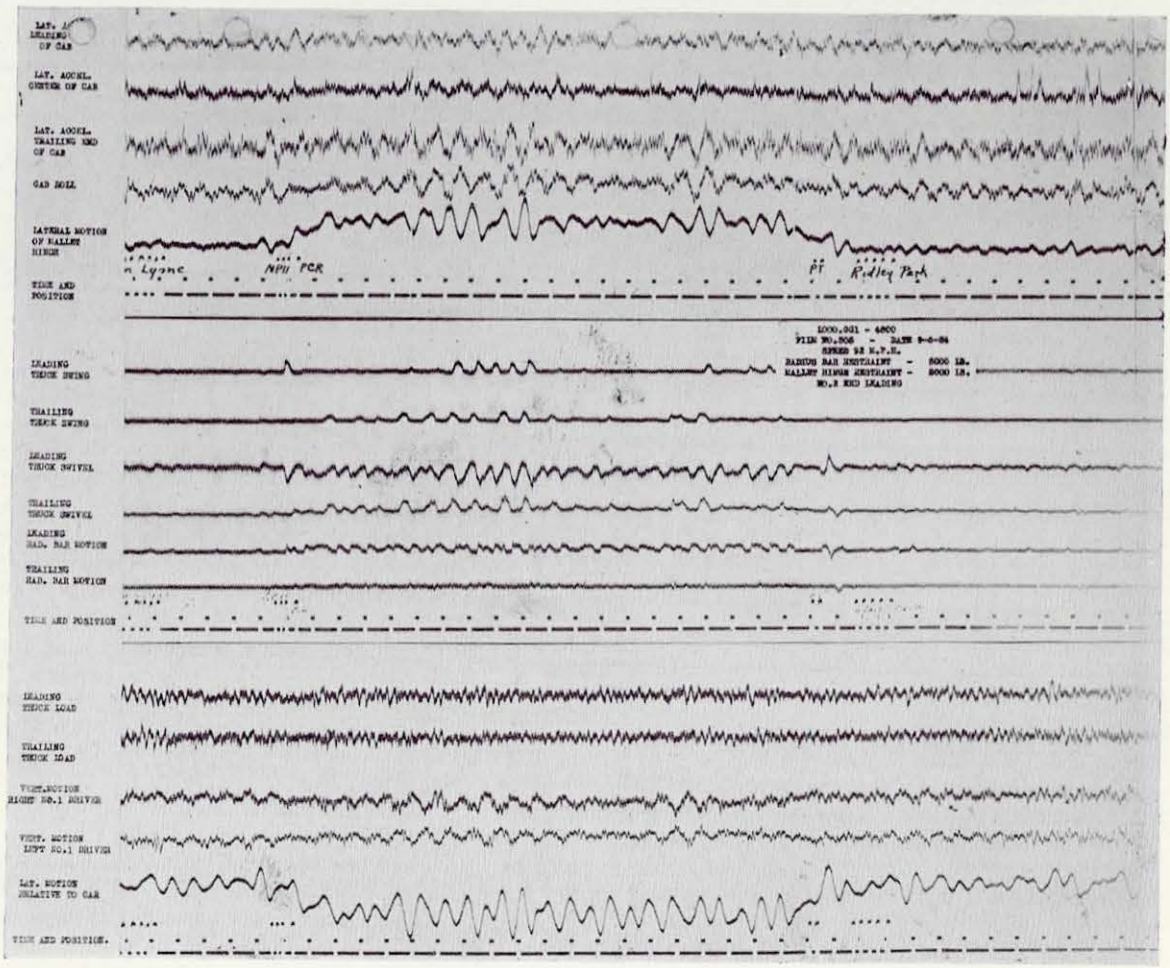


FIG. 9—Motion Indicators Mounted on Type GG1 Locomotive

FIG. 10—Motion and Acceleration Record for a Class GG1 Locomotive Running at 92 M.P.H., between Crum Lynne and Ridley Park, on the Maryland Division



(4) Truck swivel (angular displacement).
(5) Truck load (as measured by average spring deflection).
(6) Vertical axle motion.
(7) Lateral axle motion.
(8) Cab roll (measured by difference in axle motions on two sides).
(9) Truck radius bar motion.
(10) Motion of cab through center pin clearance (articulated locomotives only).
(11) Lateral motion of Mallet hinge (articulated locomotives only).
(12) Lateral motion between locomotive and test car.

The electric companies provided a contact-making clock and push-button circuits by which time and location along the railroad were marked on all records. They also provided a Selsyn synchronized drive from a car axle by which all oscillograph records, both General Electric and Westinghouse, were driven at the same speed proportional to the speed of the train, although the General Electric oscillographs were on the locomotive and the Westinghouse oscillographs were on a car. Records of short runs were obtained on film, records of long runs were obtained directly on rolls of bromide paper 100 ft. or 200 ft. long. One 100-ft. roll was sufficient for a complete continuous record between Wilmington and New York.

The track over which these runs were made is representative of Pennsylvania Railroad main-line construction. The rails are 130, 131 and 152 lb. per yard, laid on wooden ties and stone ballast.

Results of Movement and Acceleration Tests

The standard or original P5A locomotive, as shown by the Westinghouse records, oscillated severely at high speeds at a fairly constant frequency of about 1¼ cycles per second. During these oscillations lateral accelerations of the cab were measured as high as half the acceleration of gravity, truck bolster swings of 1¼ in. to each side on tangent track and truck swiveling through an

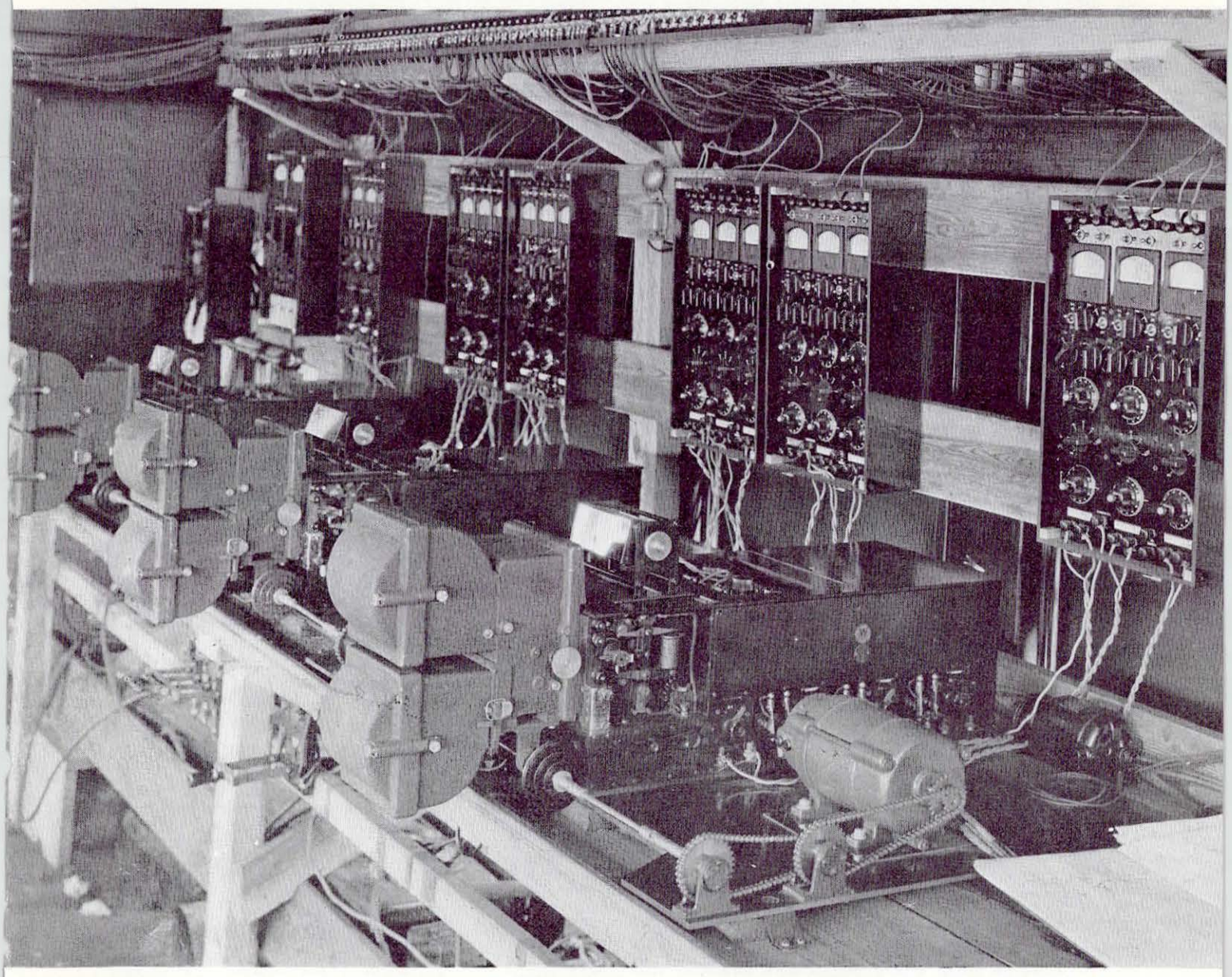


FIG. 11—Motion and Acceleration Oscillographs on a Car Attached to a Locomotive under Test

angle of 1 deg. 40 min. After modification of the engine the lateral accelerations were about one-third of gravity, the bolster swing became negligible on tangent track and the truck swiveling during oscillation was limited to the clearances in the radius bar device. The results from R1 and GG1 locomotives were comparable to those from the mdified P5A.

The large motions of the guiding trucks of the original P5A indicated that increased bolster restraint and truck restraint in the form of a radius bar would be beneficial. Records of radius bar motion with varying amounts of restraint at the end of the bar showed just how small this restraint could be made without allowing the truck to oscillate at high speeds. Records of Mallet hinge motion on the New Haven locomotive indicated the desirability of introducing lateral restraint between the hinge and the cab, and this feature was incorporated into the design of the GG1. The spring deflections were checked at the trucks and drivers to see if they were within safe limits. A typical record at high speed for the class GG1 locomotive is shown in Fig. 10.

During some of the earlier tests made during 1933 on the P5A locomotive, measurements were made of vertical accelerations on the sprung and unsprung weights. It was found that on the main frame vertical accelerations existed equal to the acceleration of gravity, whereas on the journal box accelerations as large as seven times gravity were common and the largest value measured was 13 times gravity.

Conclusions
Steam Locomotives

From long experience steam locomotives are known to negotiate rough track satisfactorily and the K4s locomotive has been in high speed passenger service for many years and has accumulated a very high mileage of successful operation.

With increase of speed the lateral blows delivered on the track by this locomotive increase gradually to a speed of approximately 85 miles per hour and then tend to decrease and these lateral blows are always well below a safe maximum.

This is a characteristic which is highly desirable to attain in electric locomotives and it will be noticed that the GG1 approaches this condition very closely and at no time delivers a higher blow than the K4s. It is in fact well below the K4s throughout its range.

Class P5A

The modified class P5A locomotive strikes no heavier lateral blows on the track at 90 m.p.h. than the original P5A at 70 m.p.h. The lateral oscillations which are set up by rough track are of less intensity and are more quickly damped than for the original P5A, but still have a rapidly rising characteristic.

Class R1

While the class R1 locomotive showed a small but consistent improvement in lateral forces over the modified P5A, this improvement was not sufficient to justify its adoption and its curve shows the same rising characteristic but at a lesser angle than the P5A. On account of its long rigid wheelbase it developed some difficulty on curved track at terminals.

Class GG1

The class GG1 locomotive was adopted as the type best suited for high-speed operation, because it showed lateral forces of much less intensity than either of the other locomotives and these forces increased more slowly with an increase in speed.

Railroads Supply Funds to Complete Eastman Reports

WASHINGTON, D. C.

FORMER Co-ordinator Joseph B. Eastman has entered an agreement with the Association of American Railroads and the American Short Line Railroad Association whereby funds will be made available for the completion and publication of reports which remained uncompleted when the co-ordinator's term expired on June 16. The principal reports involved are those on subsidies to various forms of transportation and labor standards of transportation agencies other than railroads.

The agreement, which also permits the compensation of members of Mr. Eastman's former staff who have continued work on the uncompleted reports at the risk of not being paid, provides that each of the participating railroad associations pay to Mr. Eastman an amount approximating the best estimate of the aggregate repayments of co-ordinator-law assessments which will eventually be made by the United States treasury to their member lines. The amount involved is "in the neighborhood of $18,000" and any balance remaining will be returned to the associations pro rata.

The plan was outlined in a statement issued by Mr. Eastman on September 14. This statement sketched briefly the financing of his work as co-ordinator, pointing out how during the first year of his term the railroads were assessed at the rate of $1.50 per mile of road, and how this assessment was increased to $2 per mile for the second and third years. The total amount thus raised was about $1,350,000, and it was provided that any funds remaining when the office was terminated should be returned to the carriers in proportion to their contributions. On the June 16 expiration date there remained in the co-ordinator's fund about $29,000 of which $10,000 had been definitely obligated for printing of reports by the government printing office.

The balance, Mr. Eastman says, "would have been more than sufficient to complete the unfinished reports and otherwise bring the affairs of the office to a close," and the A. A. R. on June 26 adopted unanimously a resolution expressing the view that the unexpended funds "can with benefit to the public interest be used to defray the expenses of completing" the reports in question; also it recommended that each of its members "waive its right to any refund." Later the Short Line Association took similar action. On the question of making these voluntarily-relinquished funds available, however, the acting comptroller general ruled that "The statute directs the disposition of the unexpended funds so collected and this office is without authority of law to waive the statutory requirement or to authorize any other disposition of the funds."

After giving the foregoing background, Mr. Eastman concludes his statement as follows:

> The reports in question have to do principally with the public aid given, directly or indirectly, to the various forms of transportation—railroads, water lines, highway carriers, and air carriers —, and with labor standards of these transportation agencies other than the railroads. The investigations into these matters were instituted, among other reasons, because of the claim, so often made by the railroads, that they are subjected to unfair competition as the result of the public aid given, in one way or another, to their competitors and because of low labor standards said to be maintained by certain of these competitors. This claim has been sharply disputed, and the subjects are, and for a long time have been, highly controversial. It seemed to me very desirable to get as near to the bottom of the facts as could be done. Three years have been spent on these studies, which proved to

(Continued on page 423)

Hungerford Named Chairman of New Canadian National Board

President of road heads directorate appointed to replace trustees who have functioned since January 1, 1934

PURSUANT to the reorganization of the management of the Canadian National, whereby the former board of trustees has been replaced by a board of directors, the Canadian government at Ottawa has named President S. J. Hungerford of the Canadian National as its chairman also. Other directors are:

J. Y. Murdoch, a Toronto, Ont., lawyer who is also prominently identified with mining interests, being president of the Noranda Mines, Ltd., and the Canadian Copper Refiners, Ltd., as well as a director of many other companies.

W. J. T. Gagnon, Montreal, Que., manufacturer who earlier this year served a brief term as minister of commerce and industry in the Quebec cabinet.

H. J. Symington, a Montreal lawyer who has been associated as general counsel with a number of industrial and financial concerns and who formerly acted as Western solicitor for the Grand Trunk Pacific (now C. N. R.) at Winnipeg.

S. J. Hungerford

D. H. McDougall, consulting engineer of Montreal and former president of the Nova Scotia Steel & Coal Company, Ltd., who at one time served as an assistant resident engineer on the New York Central.

R. J. Moffatt, prominent wheat grower of Bradwell, Sask., and former managing director of the Saskatchewan Wheat Pool, of which he is still a director.

A seventh director to represent C. N. R. employees will be appointed after such a one has been recommended by heads of the labor organizations or by vote of the employees.* Messrs. Hungerford, Murdoch and Gagnon have been appointed for three-year terms; Mr. Symington and the representative of the employees will serve two years, while Messrs. McDougall and Moffatt have one-year appointments. All are eligible for reappointment and Chairman Hungerford's annual salary will be $30,000 while each of the others will receive $5,000 a year. The appointments will become effective on the proclamation of the reorganization act on October 1. In the meantime the government will reach a decision as to the status of the three trustees who have been administering the road since January 1, 1934. Judge C. P. Fullerton has headed this trustee board, having resigned as chairman of the Board of Railway Commissioners to accept the position.

The new directors, while not chosen as representatives of particular industries, are nevertheless identified with branches of Canada's principal industrial activities. It is planned to have frequent meetings of the board and for this reason, Premier King said, it was felt necessary to select the majority from localities near the railway's general offices. Also, the board will be asked by the government to consider the appointment of regional advisory committees—one for the Atlantic district and another for the West.

S. J. Hungerford brings to his new office experience gained during 50 years of service with both the major railway systems of Canada, and an intimate knowledge of the transportation requirements of all sections of the Dominion. He has held, in succession, important positions of responsibility in connection with the operation, maintenance, construction and administration of the Canadian railways. His lengthy period of service has given him residence in seven of the nine provinces of the Dominion. He has lived and worked in the maritime provinces, in Quebec and Ontario, in each of the three prairie provinces and in British Columbia. Likewise, he has served in the state of Vermont, where the C. N. R. now operates the Central Vermont.

Mr. Hungerford was born near Bedford, Que., in 1872 and entered railway service in 1886 as a machinist's apprentice on the Southeastern Railway (now Canadian Pacific) at Farnham, Que. Completing his apprenticeship in 1891, he worked at his trade at various places in Quebec, Ontario and Vermont for the Canadian Pacific. In 1894 he became chargeman for the same company at Windsor street, Montreal. Three years later he was promoted to the post of assistant foreman at Farnham shops. In 1900 he went to Megantic, Que., as locomotive foreman. The following year he was transferred to McAdam Junction, N. B., as general foreman. He then went to British Columbia for two years, being locomotive foreman at Cranbrook.

In 1903-04, he was master mechanic for the Western division of the Canadian Pacific with headquarters at Calgary, Alta., and in the latter year was promoted to the superintendency of the locomotive shops at Winnipeg, Man. From 1908 to 1910 he was superintendent of shops at Winnipeg. In 1910 he resigned from the service of the Canadian Pacific to become superintendent of rolling stock of the Canadian Northern (one of the

* See news item on page 426.

predecessor companies of the present Canadian National) with headquarters at Winnipeg. In 1915 he was transferred to Toronto, Ont., in the same capacity. Two years later he became general manager of the Eastern lines of the Canadian Northern and in the following year was appointed assistant vice-president of operation, maintenance and construction of the Canadian National, then in process of formation as successor to the Canadian Northern, with the same headquarters. In 1920 he became vice-president of operation, maintenance and construction of the Canadian National and Grand Trunk Pacific. In 1922 he was appointed vice-president and general manager of the two companies and, upon their merger into the present Canadian National System in 1923, he became vice-president of operation and construction of the system with headquarters at Montreal, in which position he remained until he was chosen also as acting president of the system in 1932 when the late Sir Henry Thornton retired. On the establishment of the board of trustees on January 1, 1934, Mr. Hungerford was appointed president.

Clinchfield Rail Lubricator

AFTER several years of experimentation and road service tests, a rail lubricator has been developed on the Clinchfield which seems to give highly satisfactory results. The device, which is applied to the rear truck of a locomotive tender, is operated over the Clinchfield line twice a day, once in each direction, thus oiling the tracks twice a day. Of the 276 miles of line, there are 118 miles of curves, 85 of which vary between 3 deg. and 14 deg. The oil consumption is 6½ gal. per mile of curves per month, and the cost is $.094 per mile of curves per month. It is estimated that at least $30,000 a year is saved in the renewal of curve-worn rail alone. No attempt has been made to calculate the saving in flange-wear of wheels, but it is felt that the lubrication of rails on curves has caused a considerable decrease in flange wear as well as a decrease in number of derailments.

This device, as shown in the drawing, comprises an oil drum and pipes located under and fastened to the center sills, ahead of the rear truck of the locomotive tender. The drum is an ordinary metal oil barrel of about 50 gal. capacity. The oil is fed through pipes to nozzles located near the level of the top of the rail and directed at the inside of the rail head. A steam connection is also made at the nozzles. Near the nozzles are located self-closing spring valves in the oil line, arranged with chain connections so that when the truck swivels on a curve, the valve to the outside rail is opened and the steam jet deposits the oil on the rail. The nozzles and valves are fastened to the truck, and hose connections or flexible joints are applied in the steam and oil pipes to provide flexibility.

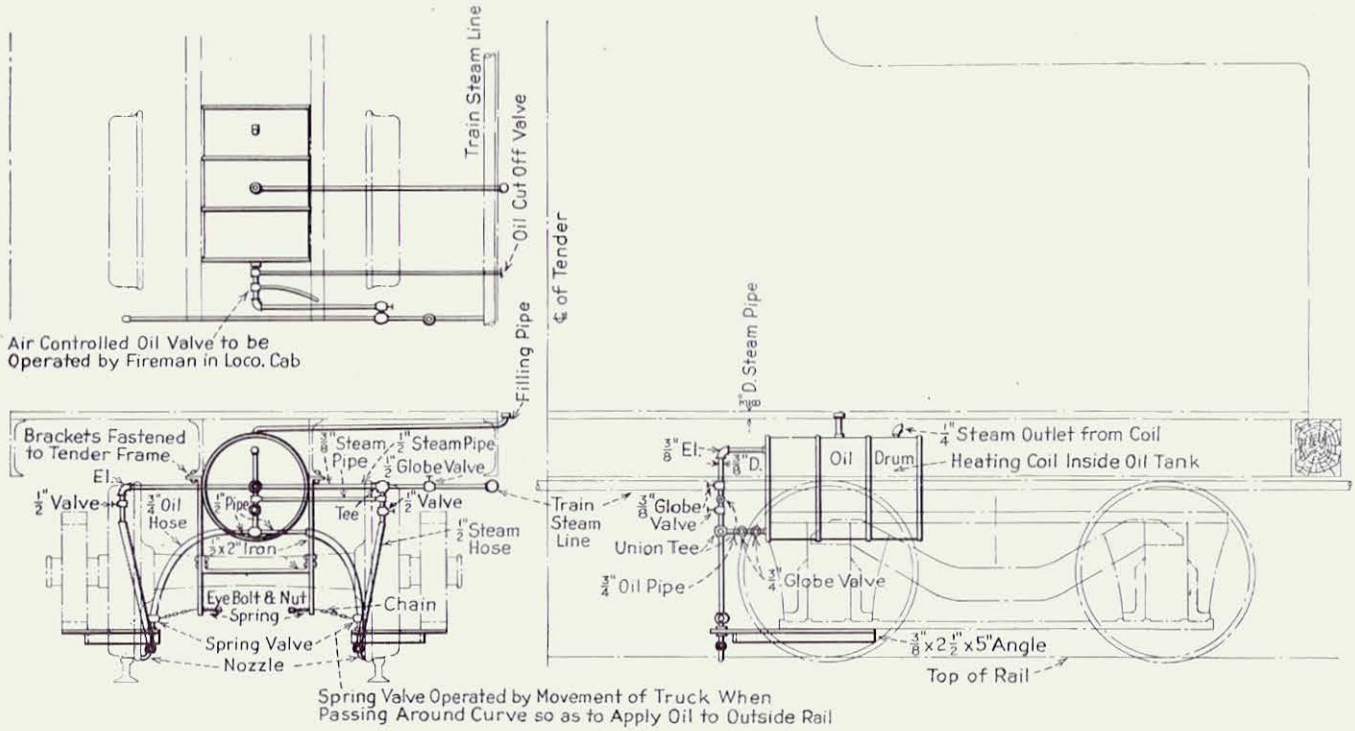
The present device is a gradual development from an earlier application which consisted of a drum of oil on top of a tender and valves manually operated by a section man located in a monkey box on the tank. So far as is known, the device is not patended.

The oil used in this rail lubricator is of a heavy viscous type thinned to the desired consistency. The successful operation of the device requires the sympathetic attention of both road and shop employees to see that the nozzles are kept in proper adjustment and condition.

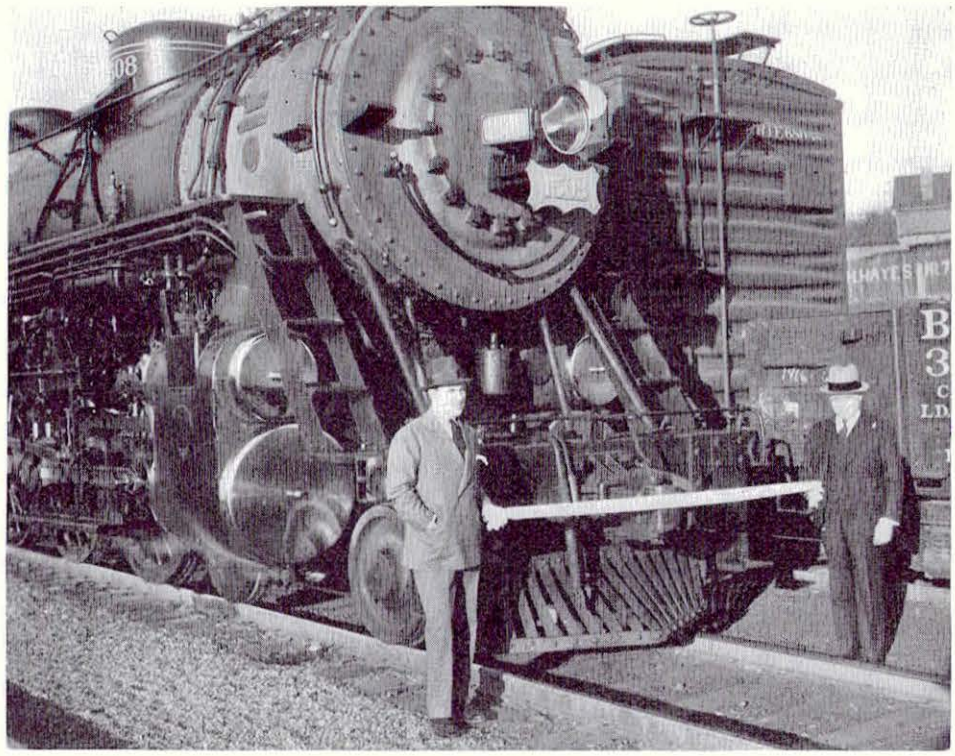
The steam flow to the nozzle is controlled manually. The valves in the steam line are set to give the desired amount of steam and the steam blows continuously whether any oil is flowing or not. The spring valves, which cause the oil to flow when the truck swivels, are closed on tangents, opened a small amount on light curves, and opened wider on heavy curves. It is necessary to maintain a close adjustment of the nozzles to prevent an undue amount of oil being deposited on top of the rail. An inspection is made at the end of each trip, and if, as sometimes occurs, the oil gets on top of the rail, sanding is necessary to prevent driving wheels slipping.

The present device has been changed somewhat from

(*Continued on page 422*)



Application of Rail Lubricator to the Rear Truck of a Locomotive Tender on the Clinchfield



Starting the "Frisco Flash," Fast Merchandise Train, on Its Initial Run

Initiative Necessary in Selling Railway Service

St. Louis-San Francisco modernizes both its service and its sales methods

"—AND we must use genuine salesmanship to sell railroad travel and freight movements just the same as automobiles and life insurance." That is the thought being conveyed to agents and solicitors of the St. Louis-San Francisco by J. R. Coulter, general traffic manager. It is indicative of the new selling philosophy of the Frisco. Smoother roadbeds, new equipment, including three new types of cars, new trains and new freight and passenger services are giving these Frisco representatives a sales kit full of tangible selling points, and Mr. Coulter, by a system of regular sales meetings with agents and solicitors, is determined to keep these sales kits full.

Regular Sales Meetings

Regular sales meetings were introduced within the last year and they are now playing the same important part in the Frisco's affairs as the semi-annual sales meetings of a great wholesale house. They are serving to inject enthusiasm into the salesmen of the system, to equip them with interesting railroad pointers, and, as a consequence, making better salesmen of them.

It was about 14 months ago that the first of a succession of new developments made its appearance. This was the combination coach-buffet-sleeper now in service on the Frisco's Memphis-Pensacola run, which has resulted in an increase of 50 per cent in travel on that run. This car, completely air-conditioned, gives passengers the option of accommodations virtually the same as Pullman equipment or of coach accommodations, with buffet service available for passengers in either end.

Soon after this car—there are two of them in service—the snack car series appeared. These novel coaches, also completely air-conditioned, offers the economizing traveler the comforts and conveniences of more expensive accommodations; and records show that travelers have been quick to take advantage of the service. On a typical run between Monett, Mo., and Paris, Tex., 300 per cent more passengers purchased meals on the snack car than during a comparable period on the standard dining car formerly used on the same train.

Last April, the Frisco brought out a distinctive luxury car combining a dining room and lounge, or sun-parlor, which has prompted more comment from passengers on the Kansas City-Florida Special than any similar improvement in many years. The most marked departures are a fireplace and venetian blinds, which go a long way towards achieving an atmosphere of homelike comfort. From a mechanical standpoint, the cars—there are two already in operation—are interesting in that they have no vestibules or steps at either end, being entered only from adjoining cars. The fireplace is realistically lighted by electricity.

In addition to the new cars, the Frisco has revived

Attractive Pamphlet Advertising Features the Frisco's Sales Campaign

its day train, the Sunnyland, between Kansas City and Memphis, which was discontinued in 1932.

The freight department, too, has seen a step-up in business tempo, with the advent of what is said to be the fastest freight in America last April. The new freight—a merchandise train—is called the "Frisco Flash." It averages faster than 35 miles per hour, and is so carefully synchronized with the needs of St. Louis jobbers and manufacturers, as well as southwestern retailers, that goods ordered in St. Louis one day can be on display counters in Tulsa, 425 miles distant, and in Oklahoma City, 542 miles away, the next morning and afternoon, respectively.

Leaving St. Louis at 8 o'clock nightly, the Flash arrives in Tulsa at 8 a.m., pauses only long enough to set out Tulsa cars, and continues on to the capital by 1 o'clock that afternoon. This schedule is five hours faster than former Frisco service, which was considered fast. Propelled by a passenger engine, speeded up by efficient handling of merchandise at stations, the train carries an auxiliary water tank with a capacity of 12,000 gal., to eliminate the necessity of stops for water. The Flash not only gives overnight service on goods originating in St. Louis, but in many cases saves a full day on merchandise moving from the north and east to Oklahoma points.

New Plan

Like the tender, the recently-instituted "Forward Frisco Plan" holds reserve fuel for the ingenuity behind the Frisco program. This new plan, developed by Mr. Coulter, is intended to be a stimulus to ideas. It calls for suggestions which will improve service, eliminate unnecessary work, save time, cut costs, or make things easier.

"There is a challenge to every railroad man and woman in the present and future outlook for transportation," wrote Mr. Coulter in announcing the plan. "Many forces are pushing forward, and there must be vast improvements in every department of railroading if we are to preserve our place in the transportation scheme. It is up to the co-ordinated idea-power of employees to keep the railroads abreast of the times."

The new program is designed to assemble ideas of employees and to assure them of a speedy hearing on the premise that "from time to time, all of us have ideas. Ofter we merely have them and do not share them. We let them stagnate when they might be put to work."

Through these various means the Frisco is combining salesmanship with modern equipment adapted to modern tastes and with a foreweighted policy of regimenting and cataloguing ideas to keep pace with progress.

Clinchfield Rail Lubricator

(*Continued from page 420*)

that shown in the drawing by replacing the oil hose with a ½-in. pipe enclosed in a larger pipe to which side pipe connections have been welded. Steam to the nozzles is passed through the outside pipe thus forming a steam jacket for the inner oil pipe. With this arrangement, and the steam jet blowing all of the time, no trouble is experienced in using the device in sub-zero weather. As a further means of assuring reliable operation, a tee, located at the junction of the steam and oil lines, is equipped with a small nozzle, forming a steam jet on the inside of the tee which provides a syphon action to assist the uniform flow of the oil when the spring valves are open.

Railroads Supply Funds to Complete Eastman Reports

(*Continued from page 418*)

be of much greater magnitude and complexity than had been anticipated. As a check, the plan was followed of sending copies of the reports in tentative form to those known to have given attention to these questions on one side or another, for criticism, and the resulting comments have been very helpful. This endeavor to leave no stone unturned in the pursuit of impartial accuracy and completeness of information has been one main reason for the delay in finishing the work.

A really enormous amount of carefully checked data has been accumulated and is now ready for publication. It is not to be expected that it will put an end to the controversies, but certainly it will afford the country a much better factual basis than is now available on which to predicate conclusions.

Since June 16, a considerable number of those who were formerly on my staff have continued to work of their own volition on these reports, knowingly running the risk that they might not be paid. Their pride in the work which they had done and their desire to see it completed have been the reasons. Other work was done for which there has been no compensation. For example, the so-called "Container Report" was released a few days before June 16. It resulted in a flood of correspondence after that date. The men who had worked on that report stayed on for some little time to take care of this correspondence. There were other like instances.

In these circumstances I have felt justified in making an arrangement with the Association of American Railroads and the American Short Line Railroad Association which will permit the compensation of these men and also permit the issuance of the reports. Under this arrangement each of these associations is to pay to me an amount approximating the best estimate which can now be made of the aggregate repayments which will eventually be made by the Treasury Department to their member lines. It is as yet impossible to determine with entire exactness these aggregate amounts, owing to the fact that there are still a few unaudited items, such as the payments to be made to the Government Printing Office for the printing of these reports out of the obligated fund of $10,000. I shall in turn place these payments from the associations in the hands of Guy L. Seaman, chief of the Section of Audit and Accounts of the Interstate Commerce Commission, as trustee. Mr. Seaman acted as disbursing officer for the Co-ordinator, and he will disburse these funds upon my requisition in the same manner, paying compensation for personal services at the rates which were paid on June 16. Any amount which may be left over will be returned to the associations pro rata.

The total amount involved is in the neighborhood of $18,000. I should in justice add that a great amount of overtime work has been done on these reports for which no compensation has been or can be paid. When the reports are issued I shall have occasion to pay tribute to the devotion and fidelity of those who have prepared them.

* * *

Courtesy Oe. V. B.

On the Austrian Western Railroad

Looking toward the Alps near Zell Am See, 257 mi. southwest of Vienna on the electrified road from Salzburg to Innsbruck. At the right is a 30-in. narrow gage steam railroad, penetrating 34 mi. into the Alpine valley of Pinzgau.

New Books...

Signal Section, Association of American Railroads; Proceedings 1935, Volume XXXIII; R. H. C. Balliet, secretary, 30 Vesey Street, New York City; 643 pages; 9 in. x 6 in., bound in cloth. Price, $8, or $4 to members of the Signal Section.

This volume is devoted wholly to the proceedings of the annual meeting held at Chicago, on March 9 and 10 of this year, though the book is dated 1935. Among the principal subjects reported on and discussed at that meeting were: Signaling on lines traversed by the numerous high-speed trains which have been put in service within the past few years; information gathered, throughout the country, concerning highway crossing signals, and the attitude of various state governments to that feature of regulation; and the use of rotaing signals at highways at a large number of crossings in the West. Included also in the Proceedings are addresses by J. C. White, general manager, Pennsylvania; S. N. Mills, Bureau of Safety, Interstate Commerce Commission, and President G. H. Dryden.

One session of the convention was devoted in part to brief obituaries of members who have died within the past two years. There are also descriptive notes made by the committee on economics, in regard to recent new installations of block and other signals, and these are illustrated by numerous halftone illustrations, copies of stereopticon pictures shown at the meeting. Committee V includes in its report a "retrospect of signaling" prepared by H. S. Balliet, veteran officer of the association.

John Stevens; Railroad versus Canal. 1812. Reprinted 1936. Pamphlet, 47 pages, 6 in. x 9 in. Published by Baker Library, Soldiers' Field, Boston, Mass. Price, $1.

The full title of this pamphlet is "John Stevens: Documents Tending to Prove the Superior Advantages of Rail-Ways and Steam-Carriages over Canal Navigation, 1812. Reprinted under the joint auspices of the Baker Library, Harvard Graduate School of Business Administration, and the Railway & Locomotive Historical Society."

Stevens is to be classed as a pioneer, not only in railroad transportation but in navigation as well, experiments having been made by him with steam propulsion, on the Delaware river and elsewhere, in 1804 and 1809. He also procured a charter for a railroad from Philadelphia westward to the Susquehanna river, about 1823, though this, like some other projects, was significant mainly as showing that Stevens was some years ahead of his time. His name came prominently before the public in November, 1928, when there was exhibited in operation, at Hoboken, N. J., a working model of the locomotive which Stevens built, about 1825, and put in operation at Hoboken on a circular track 200 ft. in diameter; the first locomotive to be run on rails in America. This exhibition, given in connection with the inauguration of Dr. H. N. Davis as president of Stevens Institute, was reported in the *Railway Age* of November 24, 1928, page 1029.

The pamphlet of 1812, now reprinted, appeared in the early years of the proposals to construct a canal from Albany, N. Y., westward to Buffalo, and one of the chief aims of the author was to get the attention of the committee which had been appointed to explore the project of a canal across the state of New York; though the appeal was sent also to Dr. Samuel L. Mitchell, a member of Congress. The pamphlet sent to Mitchell came into the hands of Charles H. Taylor, of Boston, and through him it came into the library of the Harvard Business School.

Stevens was a dreamer, but he persisted through a long series of years, and his dreams were largely in the right direction. He very confidently, and with many logical reasons, predicted the attainment of speeds of 100 miles an hour on rails, and had a host of other sensible ideas. His proposal for a railroad, as shown in this pamphlet, was, however, extremely crude. He would have the rails made of wood and set three or four feet above the surface of the ground, so as to have no trouble from snow; and he seems to have had nothing to say about brakes and other essential elements. But he promptly accepted changes and improvements proposed by his critics and insisted that all he was seeking was about $3,000 in money, with which to make experiments; and those he was sure would prove his case. The "documents," only a half-dozen, consist of letters to and from DeWitt Clinton and others.

Odds and Ends . . .

Film Star

Another railway film star is Dixie Dunbar, whose father, F. M. Dunbar, is superintendent of telephones and telegraph for the Atlanta & West Point.

Left Hand Operation

It is usually assumed that the Chicago & North Western is the only road having left-hand, double-track operation. There are, however, others; for example, the Atchison, Topeka & Santa Fe between Pineveta, Ariz., and Dallis, N. M., 384 miles.

Silver Cars

The cars of the new Denver Zephyrs have all been named with combinations of "silver." For the 20 cars, so many combinations were used, as listed below, that it is difficult to think of a common combination with "silver" that has not been used:

#1 Train	*#2 Train*
Silver Herald	Silver Courier
Silver Bar	Silver Lining
Silver Spruce	Silver City
Silver Plume	Silver Lake
Silver Service	Silver Grill
Silver Skates	Silver State
Silver Screen	Silver Tip
Silver Arrow	Silver Tone
Silver Sides	Silver Threads
Silver Streak	Silver Flash

The Mix-Up Girl

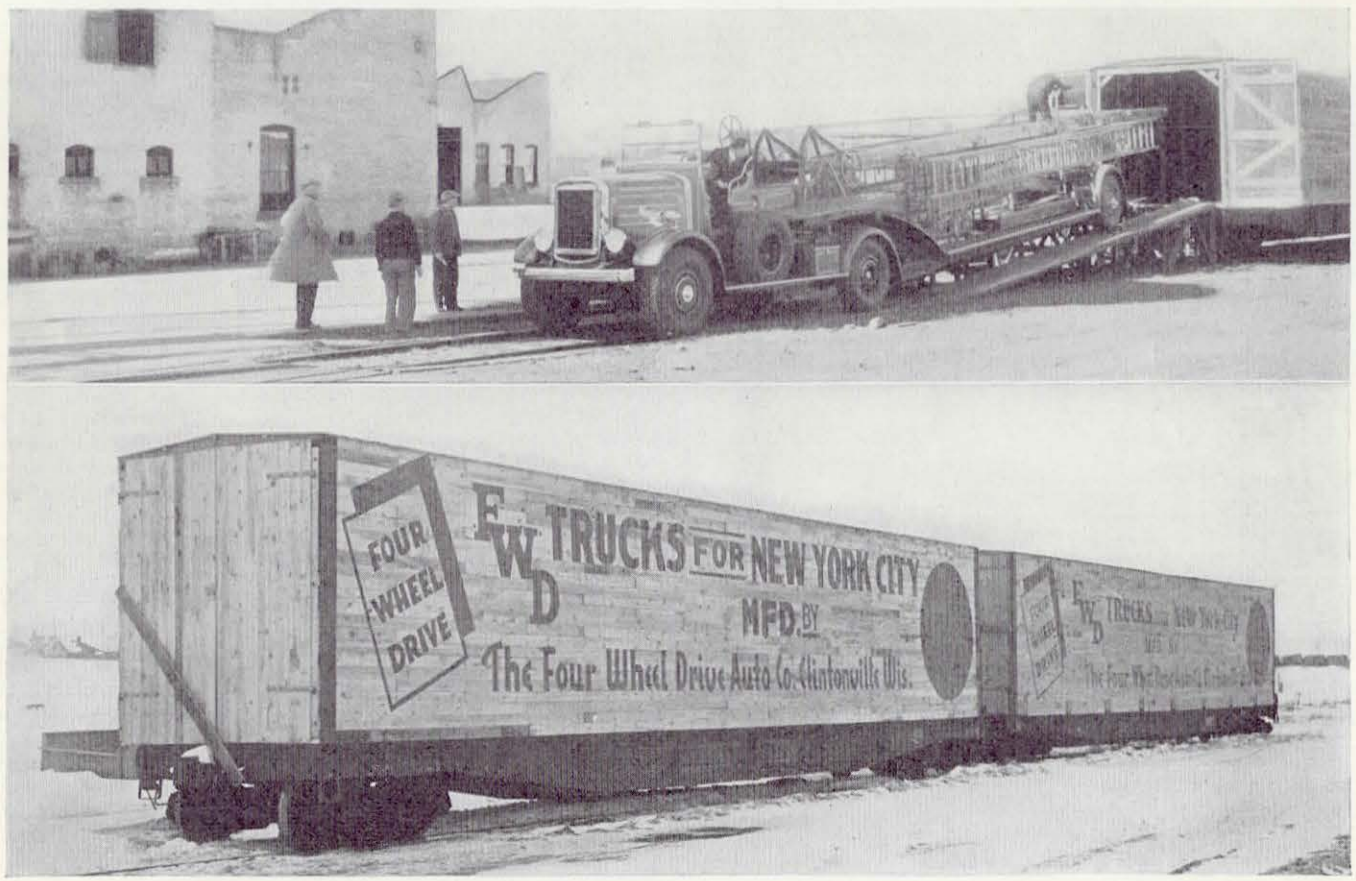
J. C. Garner, engineman for the Central of Georgia, is now the proud father of a 17-year-old daughter, who has been living with other "parents" since birth. She is the girl who was known as Madeline Pittman until recently, when she decided that the Garners were her real parents, as they have steadfastly maintained throughout the years since May 22, 1919, when, they have always claimed, a mix-up occurred which resulted in exchanging their infant for another born at the same time. After the hearing 17 years ago, the judge decided that Madeline, or Louise as she is now known, should be awarded to the Pittmans until she was old enough to choose for herself. The infant awarded the Garners, which they claimed was not their own, died at the age of eight months. A striking resemblance between Louise and the daughters of the C. of Ga. engineman seems to indicate that she, too, is really his daughter.

Safety Record

Despite the unsavory record of most airlines, the railway operated Boston & Maine-Central Vermont Airways have established the unique record of more than a million miles of operation without a single accident.

A Loading Problem

The transportation of 12 aerial ladder units of the truck and semi-trailer type, built by the Four Wheel Drive Auto Company of Clintonville, Wis., for the New York City fire department, presented a difficult problem recently. Each of these units was 61½ ft. long overall, which precluded the use of ordinary cars. The only cars that could handle the unwieldy shipments were found to be six 63-ft. flat cars owned by the Pennsylvania, and used in container service. These were sent to Clintonville and each car made two round trips. The housing of the fire equipment presented another problem, which was met by building a temporary wood superstructure on each of the cars, 63 ft. long; 9 ft. 7 in. wide; 10 ft. inside height and 14 ft. 3 in. overall height from rail. Even with all the care, clearance restrictions necessitated the movement of the loaded cars via a circuitous route to avoid certain tunnels. However, the 12 trucks were eventually delivered without damage or mishap.



How the 61½ Ft. Long Fire Trucks Were Loaded and Protected During Transit

NEWS

Ruling Protects Pensions of Employees Over 65

Retirement Board plan permits them to remain in service without reduction in annuity

The Railroad Retirement Board has announced a plan of procedure, approved by the acting Comptroller General of the United States, by which railroad employees having reached the age of 65 may remain in service without reduction in the amount of the retirement annuity payable to them on retirement under the terms of the railroad retirement act. The law, one important purpose of which was to encourage the retirement of railroad employees at age 65, provides for a reduction of one-fifteenth in the retirement annuity for each year they remain in service after that age except where employees are continued in employment "under an agreement in writing between the carrier and employee filed with the board, which agreement may provide for extension of employment for one year and thereafter in like manner for successive periods of one year each." Because the railroads are contesting the law in the courts and have obtained an injunction restraining the collection of taxes from them for the purpose of paying pensions, most of the railroads have declined to sign such agreements and employees desiring to remain in service, because of uncertainty as to the outcome, or for other reasons, have been faced with the possibility of having their retirement incomes reduced.

In order to remedy these conditions, the board announced, it has devised a procedure by which employees may comply with the law and avoid reductions in annuity without securing the signature of a carrier official on the continued service agreement. The acting Comptroller General has issued a ruling that the term "agreement" as used in the act is not necessarily synonymous with "contract" and that the fact that an employee is continued in service when he could be retired by the carrier is proof that the carrier has in fact agreed to the continuance. A general statement by the carrier to employees over 65 that they may continue in service and a letter by the employee to the carrier agreeing to continue, the board said, will, if filed with the board, be sufficient to constitute compliance with the act under regulations adopted on September 10 by the board. Another regulation provides that an employee who is in fact continued in service complies with the act and avoids reduction in annuity if he signs an agreement to continue in service on the form prescribed by the board and submits with it an affidavit stating that he attempted to secure the signature of the proper carrier official and such signature was refused and that he has given notice to the carrier of his wish to remain in service by delivering a copy of the continued service agreement to a carrier official personally or mailing it to the carrier.

According to the announcement this new regulation, either now or within the next few months, will affect more than 50,000 railroad employees whose position was rendered uncertain by the carriers' refusal to sign the agreement.

Railway Club of Pittsburgh

"The Oil Industry and Its Relation to Railroads" will be the subject for consideration at the next meeting of the Railway Club of Pittsburgh at the Fort Pitt hotel, Pittsburgh, Pa., on Thursday evening, September 24. R. J. S. Pigott, staff engineer of the Gulf Research and Development Corporation, will be the speaker.

Federal Barge Line Strike

Approximately 350 employees of the federal barge lines went on strike on September 9 in a demand for increased wages. About 250 of the strikers were freight handlers, the rest clerks and checkers. The first group, members of the international longshoremen's union, is asking a 20 per cent wage increase, and the others 30 per cent.

Flower Show in P. R. R. Station, Philadelphia

Flowers from California feature the annual dahlia and fall flower show held in the main concourse of the Pennsylvania Station, Thirtieth Street, Philadelphia, September 18-19, according to an announcement made today by the Pennsylvania Horticultural Society of Philadelphia.

This is the first big horticultural exhibit ever scheduled to take place in an American railroad terminal. The railroad is co-operating with the Philadelphia Society by providing space in its new station on the west bank of the Schuylkill River. Medals, cups, certificates of merit and other prizes which amateur growers will be privileged to accept will be awarded in the railroad section of the flower show for the best displays entered by the employees of the railroads of the country and those of the Railway Express Agency.

Freight Revenues Grow Faster than Passenger

Greater percentage rise in former is indicated by incomplete summaries for August

Railroad passenger revenues in August continued the large increases as compared with those for the corresponding months of last year which had been shown in June and July, according to incomplete summaries published by the Bureau of Statistics of the Interstate Commerce Commission based on estimates voluntarily submitted by the railroads in advance of the regular sworn reports. These summaries have been widely published and are frequently commented upon as indications that the increases in passenger revenues are almost entirely caused by the reductions in passenger fares which occurred in the eastern district on June 1. The reports show, however, an even greater percentage of increase in freight revenues, although there was no general change in freight rates, and greater percentages of increase in passenger revenues are shown in the western and southern districts, where fares had been reduced long before the commission's order, than in the eastern district.

According to the summary issued on September 15, 37 of the 53 Class I roads in the eastern district showed an increase of 21.9 per cent as compared with the figures for August, 1935, in freight revenues and an increase of 13.9 per cent in passenger revenues. In the Pocahontas region 3 out of 4 roads showed an increase of 19.8 per cent in freight revenues and an increase of 21 per cent in passenger revenues. In the southern region 21 out of 28 roads reported an increase of 19.2 per cent in freight revenues and an increase of 18.2 per cent in passenger revenues. In the western district 39 out of 59 roads reported an increase of 17.4 per cent in freight revenues and an increase of 16.4 per cent in passenger revenues.

I.C.C. Files Suit to Dismiss Spotting Order Injunction

The Interstate Commerce Commission, in a petition filed on September 11, in the federal district court at Chicago, asked that court to dismiss the suit of the American Steel Foundries to enjoin the commission's order of May 28, 1936, outlawing terminal allowances paid by railroads to large industries. The American Steel Foundries, in its bill of complaint filed on August 20, which named the Elgin, Joliet & Eastern and the Indiana Harbor Belt,

contended that it maintains its own locomotives to spot cars from the interchange tracks of the two roads to points within its plant at Indiana Harbor, Ind., and is entitled to the allowances made by these railroads for this service. The commission, in its petition, contends that all industries, including American Steel Foundries, were accorded a full hearing before the order was entered, and that the commission did not exceed its authority in making the order.

Denver Zephyrs Complete 200,000 Miles

The Advance Denver Zephyrs of the Chicago, Burlington & Quincy, which were placed in service on a 16-hour schedule between Chicago and Denver, Colo., on May 31, completed 200,000 miles on September 5. During this 97-day period, the Advance Zephyrs were late only four times. The schedule calls for an average of 65 miles an hour. A total of 14,669 passengers was carried on the 194 trips.

New England Shippers' Board

The New England Shippers' Advisory Board held its regular meeting at South Poland, Me., on September 11, with an attendance of about 185. The commodity committees presented reports which in the aggregate call for a prediction of about 5 per cent increase in freight shipments in the next quarter, as compared with the fourth quarter of last year. In some commodities the increases are as high as 25 per cent. The Dairy Products Committee expects a decrease, because of the increased movement of milk and cream to Boston by trucks on the highway.

Railroad Enthusiasts, Inc.

The New York Chapter, Railroad Enthusiasts, Inc., will hold its first Fall meeting on Friday, September 25, in Room 2726, Grand Central Terminal, at 7:45 p.m. The principal speaker at this meeting, which has been designated "Lackawanna Night," will be John Draney, veteran engineer of the "Lackawanna Limited," who will recount his experiences. Other speakers will be C. L. Chapman, eastern freight traffic manager of the Erie, and Robert Kemp, vice chairman of the chapter. The meeting will close with a program of motion pictures presented by the D. L. & W.

Western Tour Business Near All-Time High

Western tour business during the past season reached the 1929 peak, according to preliminary reports. In many instances escorted tours through the West equalled and in some cases surpassed the record for 1929, which for the national parks and other western outdoor vacation lands was the banner year. The Chicago & North Western now reports the biggest tour year in the history of that line, the total exceeding by several hundred passengers the 1929 high mark on the road. The Chicago, Burlington & Quincy reported a 50 per cent increase over last year's escorted tour figures, and anticipates that final figures will place this year's volume above that of the previous high mark established in 1929. The Chicago, Milwaukee, St. Paul & Pacific reports an increase of approximately 40 per cent in its tour business over last year's mark, with the bulk of tour travel directed to Yellowstone and the Canadian Rockies. The Atchison, Topeka & Santa Fe's tour business was the largest ever experienced.

Freight Forwarding Investigation

Hearings in connection with the Interstate Commerce Commission's investigation of freight forwarders will be opened at the Hotel Pennsylvania, New York, on October 13 at 10 a.m. Commissioner Porter and Examiner Trezise will conduct the hearings. The announcement states that additional hearings will be held as speedily as possible at other important points throughout the country such as Chicago, St. Louis, Mo., Dallas, Tex., San Francisco, Cal., and Portland, Ore.

At the New York hearings testimony will be taken as to the practices of carriers operating in New England, Trunk Line and Southeastern territories, including particularly the following roads: Boston & Maine; Boston & Albany; New York, New Haven & Hartford; New York Central (Erie and East); Delaware, Lackawanna & Western; Lehigh Valley; Reading; Pennsylvania (Pittsburgh and East); Baltimore & Ohio (Pittsburgh and East); Erie (Buffalo and East); Delaware & Hudson; Southern Railway.

O. R. C. Man Named to C. N. R. Directorate

B. L. Daly, general chairman for the Order of Railway Conductors on the western lines of the Canadian National, with office at Winnipeg, has been chosen by C. N. R. employees as their representative on the new C. N. R. board of directors. Mr. Daly was chosen at a closed meeting of union chairmen held in Montreal last week, and his name forwarded to the Minister of Transport prior to publication.

The choice was confirmed by Order-in-Council of the Governor-General at Ottawa later. This is the first time in Canadian railway history that labor has named its own representative to the directorate.

Stock Yard Tariff Suspended

The Interstate Commerce Commission has suspended from September 15 until April 15, 1937, the operation of schedules published in a Chicago Great Western tariff proposing to add the Union Stock Yard & Transit Company of Chicago as a participating delivering carrier in joint through rates on livestock, carloads, shipped to the Union Stock Yards in Chicago, Ill., via the Chicago Great Western, whereby the Union Stock Yards will receive a division of the through rate instead of its customary unloading or loading charges.

P. W. A. Grants for Grade Separation

Elimination of 15 railroad-highway grade crossings and 2 railroad line grade crossings in New Jersey, at a cost of $5,025,300, is provided for in Public Works Administration grants totalling $2,260,170 announced by Harold L. Ickes, Public Works Administrator. One of the grade crossing elimination projects is in Woodbridge, Middlesex county, and another is in Colonia, Middlesex county. The others are in Elizabeth, Union county. It was estimated by the applicant that the projects will provide 2,973,360 man-hours of employment. Cost of the Elizabeth project alone is estimated at $4,691,000. A grant of $2,110,950 was made for it. This work, it was estimated, will require 2,765,880 man-hours of employment spread over a period of two years. Most of these crossing eliminations are along the Elizabethport and Perth Amboy branch of the Central of New Jersey. In some instances railroad tracks are to be raised above streets. In others streets are to be depressed.

Seek Wage Rise in Canada

Canadian railway employees' representatives met in Montreal last week to discuss restoration of pay cuts by the railway companies. What will be sought will be a restoration of full basic wage rates, reduced 15 per cent during the depression and only partially restored since.

The chief executives' association of the standard railway organizations consulted with the representatives in Canada of the railway labor organizations on the matter. The Canadian labor organizations had 76 representatives at the Montreal meeting for the discussions.

Wage scales are ten per cent lower than prevailing rates in the United States, it is declared. In May of last year, following negotiations between the management and the employees' representatives in Montreal, five per cent of the 15 per cent cuts made in wages since the depression, was restored. The employees' representatives will now seek to have the 10 per cent balance restored.

Car Men Not to Meet

In view of the expressed desire of the general committee of the Association of American Railroads, Mechanical division, that all members of minor mechanical associations attending conventions this fall do so on their own time and at their own expense, the Car Department Officers' Association has decided not to meet this year. The officers of this association stand ready to function just as soon as they are authorized to do so by the Association of American Railroads and, with the improved business outlook, they hope that it may be possible to hold a meeting next year.

Largest Shipment of Raisins

The largest single shipment in the history of California's raisin industry left the main plant of the Sun-Maid Raisin Growers' Association at Fresno, Cal., on August 31 enroute to Kansas City, Mo. A solid train made up of 60 cars carried approximately 2000 tons of raisins in bulk and package, valued at more than $200,000. One thousand acres of vineyards were required to produce this tonnage. The shipment moved over the Atchison, Topeka & Santa Fe and connections on a perishable freight schedule. It preceded by a few weeks the regular movement of the 1936

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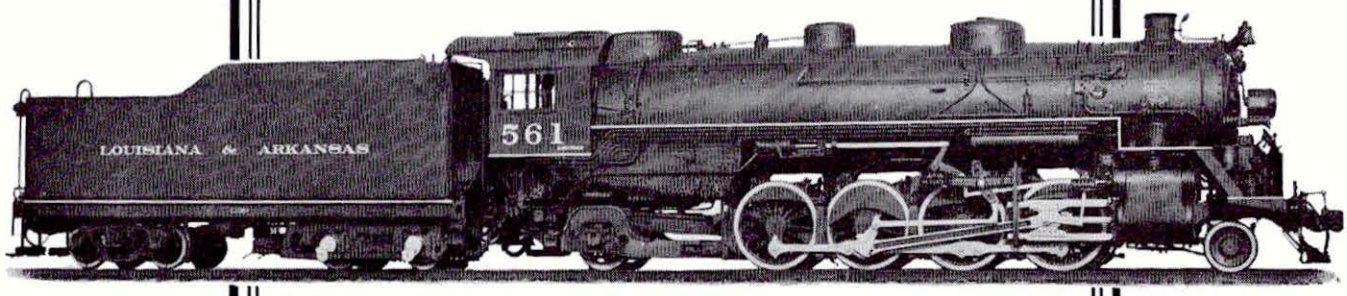
MODERN



LOUISIANA AND ARKANSAS MIKADO

POWER

Five Modern Mikado Type Locomotives recently completed by Lima Locomotive Works, Incorporated, for the Louisiana and Arkansas Railway are designed for fast freight service which requires high starting power and high sustained drawbar pull at speed.

With a boiler pressure of 240 pounds and weight on drivers of 208,500 pounds, they develop a starting tractive effort with the Booster of 71,300 pounds.

Modern Power such as this is highly efficient and economical in operation, low in maintenance costs and has a high factor of availability.

LIMA
LOCOMOTIVE WORKS
INCORPORATED

LIMA LOCOMOTIVE WORKS, INCORPORATED, LIMA, OHIO

crop, due September 15. From Kansas City the shipment was distributed to midwestern, southern and eastern states.

Frank Thomson Scholarships

Charles A. Lister, Trenton, N. J., and Morton L. Meier, Fort Wayne, Ind., are the recipients this year of the Frank Thomson scholarships awarded annually by the Pennsylvania Railroad to sons of employees, suitably qualified, which are good for four years at approved institutions of learning. The first-named, son of a draftsman, has enrolled at Tufts College, School of Engineering, and the other, son of a locomotive engineman, in Purdue University. These scholarships, from a fund given by sons and daughters of the former president of the road, are worth $800 annually, for four years, to each person appointed.

Railway Employment in August

Class I railways reported to the Interstate Commerce Commission as of the middle of August a total of 1,090,016 employees, an increase of 7.81 per cent as compared with August, 1935, and an increase of 0.48 per cent as compared with July. The number of employees in train and engine service was 10.86 per cent above August last year and 0.71 per cent above the previous month. With adjustments for seasonal variation, the Interstate Commerce Commission's Bureau of Statistics estimates that employment in August was 59.5 per cent of the average 1923-25 level.

Long Island Increases Passenger Train Service

The Long Island announces that, beginning September 20, there will be 80 more passenger trains than in the fall time table last year, which will bring the total number of these trains up from 764 to 844. These changes are mainly for the accommodation of points outside the 10-mile radius of the heavy suburban service, and will for a number of divisions or branches increase the frequency of trains in non-rush hours from about one hour apart to about 30 minutes.

The trains on the Long Island are run on Daylight Saving time, so that on the resumption of Standard time, September 27, trains will be set back along with the clocks.

New Equipment

Class I railroads of the United States on August 1 had 27,151 new freight cars on order, according to reports compiled by the Association of American Railroads. On August 1, last year, there were 2,174 on order, and on August 1, 1934, the number on order totaled 13,755.

New locomotives on order on August 1, this year, totaled 85, of which 65 were steam locomotives and 20 were electric and Diesel locomotives. This compares with four steam locomotives and four electrics on order on August 1, 1935, and 35 steam and 107 electric locomotives on order on August 1, 1934.

New freight cars placed in service in the first seven months of this year totaled 14,914, compared with 2,272 new cars installed in the corresponding period of 1935, and 9,485 cars installed in the same period of 1934. Forty new locomotives were placed in service in the seven months' period this year, of which 26 were steam locomotives and 14 electric and Diesel engines. This compares with 27 steam and 99 electric locomotives installed in the corresponding period of 1935, and six steam and eight electric locomotives installed in the same period of 1934.

H. W. Wolff Celebrates His Fiftieth Anniversary with A. C. F.

Herbert W. Wolff, senior vice-president in charge of sales of American Car & Foundry Company, celebrated on September 11 the occasion of his fiftieth anniversary with that company and its predecessors. He received his early education in the public schools of Detroit, Mich., and began his career with the Michigan Car Company, Detroit, which later was consolidated with the Peninsular Car Company under the title Michigan Peninsular Car Company. Later in 1899 when that company together with 14 other manufacturing companies came together and the American Car & Foundry Company was formed, he was placed in charge of the

Herbert W. Wolff

mechanical department at St. Louis, Mo. In 1912 he was appointed assistant to the vice-president and in 1916 was made vice-president in charge of sales in the Chicago district. In the capacity as vice-president of A. C. F. he spent considerable time in Washington, D. C., during the World War co-operating with the United States Railroad Administration in co-ordinating industrial forces. In 1925 Mr. Wolff was elected a director of A. C. F. and in the same year he was made executive head of sales of the entire corporation, with offices in New York. In 1935 he was appointed senior vice-president.

Narrow-Gage Train Taken Off After 54 Years

After more than fifty-four years of continuous service, the narrow-gage passenger train operated through Black canyon, west of Gunnison, Colo., by the Denver & Rio Grande Western has been discontinued, the final round trip between Gunnison and Montrose being made on August 28. In July the road received permission from the Colorado Public Utilities Commission to substitute motor buses for the rail service. This section of line built through the mountains between Sapinero and Cimarron, a distance of 19 miles, was considered one of the early day engineering feats of the Rio Grande. The first passenger train was run through the canyon on August 13, 1882.

Trans-Missouri-Kansas Shippers' Board

The forty-sixth regular meeting of the Trans-Missouri-Kansas Shippers' Board will be held at Pittsburg, Kan., on September 22. Besides the reports of committees, such subjects as The Itinerant Trucker Problem, Classification, and Dunnage Allowance on Box Cars will be considered. L. C. Williams, assistant director, extension service, Kansas State college, and W. L. English, agricultural commissioner of the St. Louis-San Francisco, will discuss the Soil Conservation Program. At a joint luncheon of the board and the Pittsburg Chamber of Commerce, John Paul Jones, editor of the Lyons (Kan.) Daily News, will be the speaker.

Burlington Veterans Hold Annual Reunion

The sixteenth annual reunion of the Veterans' Association and the Ladies' Auxiliary of the Chicago, Burlington & Quincy was held at Galesburg, Ill., on September 18 and 19, with an attendance of approximately 2,000 persons. This association is composed of employees who have had 20 or more years' service on the Burlington or its subsidiaries. There are 28 local chapters of the Veterans' Association, while the Ladies' Auxiliary to the Veterans' Association has 23. The first day of the reunion was devoted to business sessions, while the program for the second day included a get-together and sight-seeing trips, with a banquet in the evening at which Ralph Budd, president of the Burlington, was the principal speaker.

Off-the-Beaten-Path Excursion

The Pennsylvania, on Sunday, October 4, will operate an "off the beaten path" excursion from Chicago to historic points in northern Indiana. This trip, like those conducted on July 12 and August 23 out of Philadelphia, will be sponsored by a branch of the Railway & Locomotive Historical Society. The tour will start from the northern side of the Chicago Union station at 9 a. m., eastern standard time, and will follow the Pan Handle route north to about Lake street, thence west to Western avenue, south through the industrial section of southwestern Chicago and the residential district of Beverly Hills, and southwest through Crown Point, Ill., North Judson and Winamac, and will arrive at Logansport, Ind., at 11:50 a. m., eastern time. A half-hour stop will be made at this point to enable passengers to take pictures of locomotives and other equipment, after which the train will pro-

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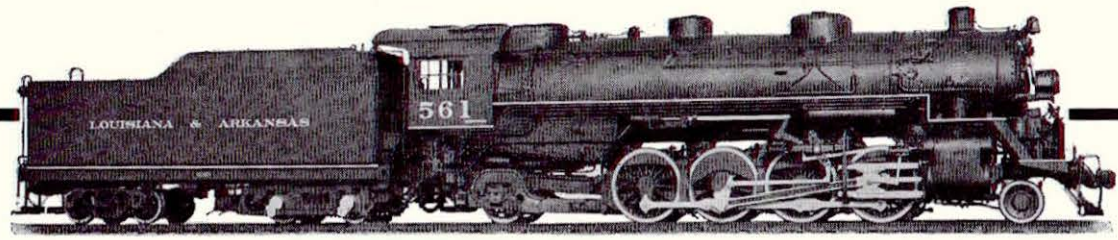
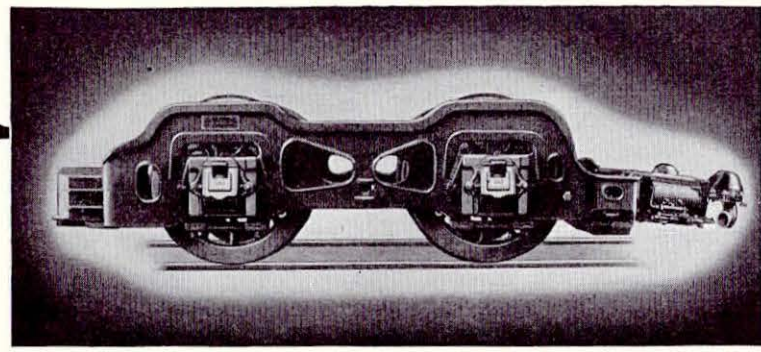


THIS NEW MODERN POWER FOR THE LOUISIANA & ARKANSAS INCORPORATES THE LOCOMOTIVE BOOSTER



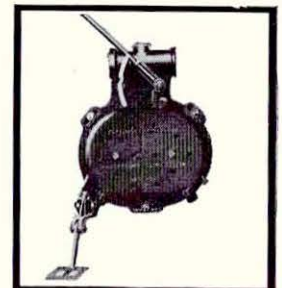
The Locomotive Booster

On the new Mikado Type Locomotives recently delivered by Lima Locomotive Works, Incorporated, to the Lousiana & Arkansas Railway the Locomotive Booster is incorporated as an integral part of the design.

This modern power carries 240 pounds boiler pressure and develops a starting tractive effort of 71,300 pounds of which the Booster delivers 16,500 pounds.

In any locomotive the Booster improves operation by quicker acceleration and smoother starting. It materially reduces maintenance costs by avoiding excessive starting stresses that cause undue shock and wear.

Modern power is Booster power.



The Franklin #8 Butterfly Type Firedoor increases the efficiency of locomotive firing.

When maintenance is required a replacement part assumes importance equal to that of the device itself and should be purchased with equal care. Use only genuine Franklin repair parts in Franklin equipment.

FRANKLIN RAILWAY SUPPLY COMPANY, INC.

NEW YORK CHICAGO MONTREAL

ceed northeast over the Butler line, on which there has been no passenger train service for several years. On this portion of the tour, the special will pass through Denver, Ind., Roann, North Manchester, South Whitley, Columbia City, Churubusco and LaOtto, where it will pass to the tracks of the Grand Rapids division and proceed to Fort Wayne. Here an hour's stop will be made for an inspection of the enginehouse and for further picture taking. Departure from Fort Wayne for home will be at 4:20 p. m., and the train will be run at the speed of the Detroit Arrow, with arrival in Chicago at 6:35 p. m.

Smoke Prevention Manual

The Smoke Prevention Association has just issued an 82-page illustrated "Manual of Smoke and Boiler Ordinances" which not only lists the local smoke abatement boards and requirements in various cities throughout the United States, but contains much useful information regarding how to secure more efficient combustion and hence a reduction of the smoke nuisance. The book contains a Ringleman chart for grading smoke density, a code for rating heating boilers, a table of head room requirements for smokeless boiler settings, and excerpts from papers presented at recent conventions of the Smoke Prevention Association. This book, which is valuable for reference purposes, may be secured by writing to the executive offices of the association, City Hall Square building, Chicago.

P.R.R. Research Activities

How the Pennsylvania, through research and experimentation, utilizes the advances of science, new inventions and improved technical processes for the improvement of its freight and passenger service is told in a special report which has just been made public.

While it points out that the Pennsylvania has conducted research practically from its inception, the report deals most fully with nine outstanding projects recently completed or still under way, as follows:

1. Special electric locomotive tests at Claymont, Del., over a section of track equipped with instruments to measure the pressures and stresses of locomotive wheels on the rails. These tests led to the selection of the types of locomotives used in the high-speed electrified passenger service in the eastern seaboard territory.

2. Development of the streamlined contours of the new electric and steam locomotives through wind tunnel tests, in which, for the first time, clay models capable of immediate alteration in shape were used.

3. Numerous forward steps in the electrification of the roadway between New York, Philadelphia, Pa., Baltimore, Md., and Washington, D. C., including improved circuit breakers, a non-corrodible wire system, better transmission circuits, elimination of high voltage circuit breakers from locomotives, and a superior type of track circuit bond.

4. Locomotive road tests over various sections of the system, using electrically-operated instruments which recorded on a photographic film the forces exerted at the axles and elsewhere on the locomotives at various speeds.

5. A series of bridge tests now under way near New Brunswick, N. J., Chester, Pa., and Elkton, Md., for the practical revision of certain theoretical formulae used in calculating the effects on bridges of train movements over them.

6. Extensive research in air-conditioning passenger cars, producing improved apparatus and a scientific scale of differentials between interior and exterior temperatures for maximum health and comfort.

7. The development of a new spring arrangement for freight cars to prevent excessive vertical movements of the car body and protect the contents from damage.

8. Development of a new 152-lb. rail, the heaviest regularly used anywhere in the world, which, as a result of extensive research in design, is only 17 pounds heavier than the rail formerly in use, but 80 per cent stronger.

9. The invention of a new rail joint in which the bars are curved or "waved" in such a manner as to reduce wear, always maintain a tight joint and produce a smoother riding track.

In 1874 the Pennsylvania established a department of physical tests at its Altoona, Pa., shops, followed by a chemical laboratory in 1875 and a bacteriological laboratory in 1889. These were the first test plants of their kind developed by any railroad. Since 1905 a locomotive test plant has been an important feature of the research equipment.

The Pennsylvania's new report on research is incorporated in the September issue of "Train Talks," which is now being distributed to passengers on trains throughout its lines.

Equipment and Supplies

LOCOMOTIVES

THE ST. LOUIS SOUTHWESTERN is inquiring for five locomotives of the 4-8-4 type.

THE UNITED FRUIT COMPANY has ordered five locomotives of the 2-8-2 type for service in Guatemala from the Baldwin Locomotive Works. Inquiry for this equipment was reported in the *Railway Age* of August 8.

FREIGHT CARS

THE ELGIN, JOLIET & EASTERN will repair 300 box cars in its own shops.

THE UNION RAILROAD COMPANY has ordered 100 gondola cars of 70 tons capacity from the Ralston Steel Car Company.

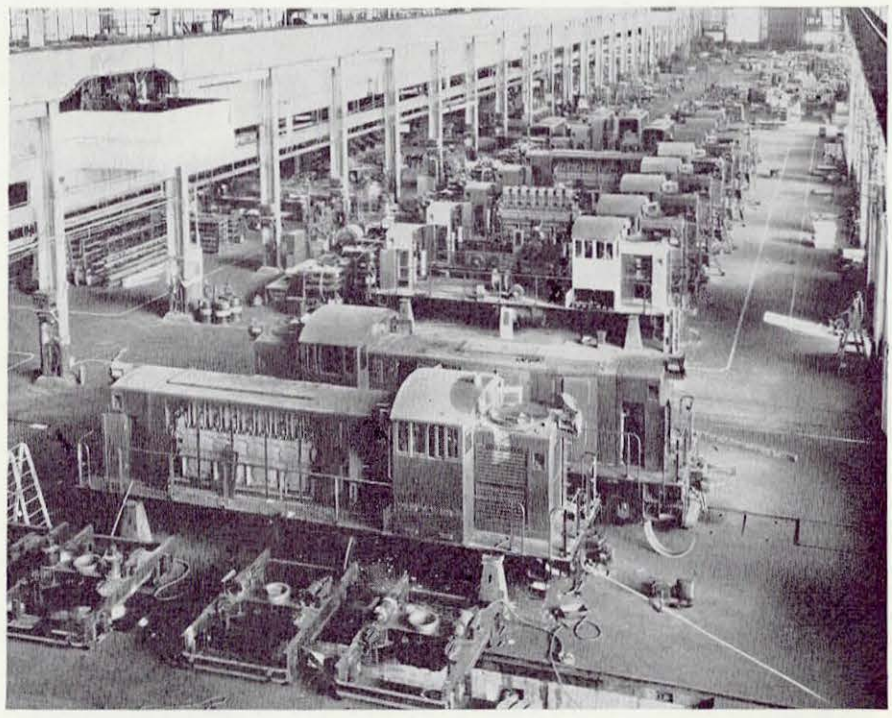
PASSENGER CARS

THE NEW YORK CENTRAL has placed an order with company shops for two coaches which will be used on the Mercury, to handle increased patronage on this train. These coaches will be similar to those now on the seven-car train, which was placed in service between Cleveland, Ohio, and Detroit, Mich., on July 15.

IRON & STEEL

THE ATCHISON, TOPEKA & SANTA FE is inquiring for 90,000 tons of rails.

* * * *



Ten New Diesel-Electric Switching Locomotives, Soon to Be Delivered to the New York, New Haven & Hartford, Are Shown Being Assembled in One of the Shops of the General Electric Company at Erie, Pa. Five of the Locomotives have Ingersoll-Rand and Five Have Cooper-Bessemer Diesel Engines—All Have G-E Electric Equipment

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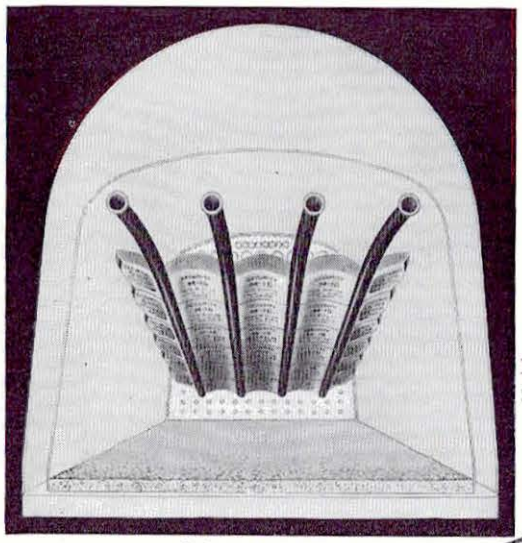
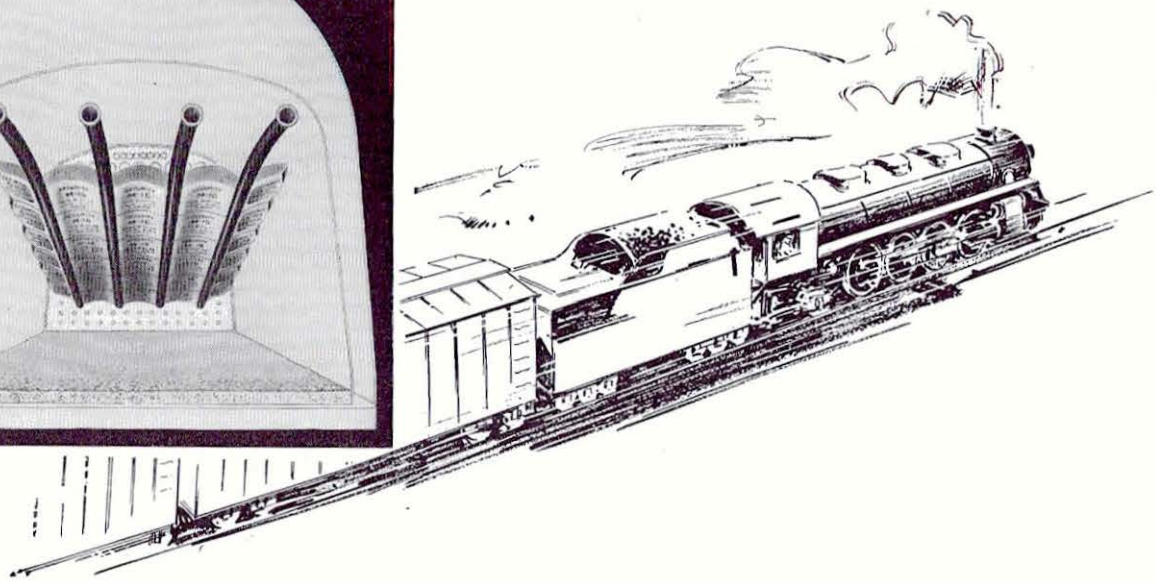


There's More to
SECURITY ARCHES
Than Just Brick



THE HARDER THE LOCOMOTIVE WORKS

the More

THE SECURITY BRICK ARCH SAVES

The rough battle scarred undersurface of the Security Arch tells a tale of big coal saving.

Large modern power, longer runs, higher firebox temperatures are tough on Arch brick but they all increase the returns from the Security Arch.

Measured in terms of thousands of ton miles the Security Arch renders greater service than it did when conditions were less severe.

Measured in terms of fuel consumed the Security Sectional Arch is today one of the most effective of all fuel economy devices.

HARBISON-WALKER REFRACTORIES CO.

Refractory Specialists

AMERICAN ARCH CO.
INCORPORATED

Locomotive Combustion Specialists » » »

Supply Trade

Calvin Verity, executive vice-president of the **American Rolling Mill Company,** Middletown, Ohio, has been elected a member of the board of directors of the **Rustless Iron & Steel Corporation** to fill the vacancy created by the death of **George M. Seaman.**

E. W. Backes, chief engineer and western representative of Standard Equipments, Inc., with headquarters at Chicago, has resigned to become sales engineer of the **Rail Joint Company,** effective September 16, with headquarters at 1310 Railway Exchange building, Chicago.

Frederick S. Cook has been appointed Pacific Coast manager of the **Robert W. Hunt Company,** Chicago, with headquarters at San Francisco, Cal. Since 1919 he has been vice-president and secretary of the McCraken-Ripley Company, Portland, Ore.

Frederic E. Lyford has been appointed assistant to **Robert S. Binkerd,** vice-president of the **Baldwin Locomotive Works.** Mr. Lyford, since February, 1934, has served as an examiner for the Railroad Division of the Reconstruction Finance Corporation, which position he resigned to join the Baldwin organization.

Herbert A. May has resigned as vice-president of the **Safety Car Heating & Lighting Company** to become vice-president of the **Union Switch & Signal Company,** with headquarters in Pittsburgh, Pa. Mr. May will retain his interest in the Safety Car Heating & Lighting Company, of which company he will continue as a director.

The Carnegie-Illinois Steel Corporation, a subsidiary of the **United States Steel Corporation,** announces that it has adopted a new trade name, USS CARILLOY, to identify alloy steels produced by this corporation. The new name does not signify a new product, nor does it apply to any single alloy steel. It is simply a new trade designation which will serve for the entire group of alloy steels previously marketed as Carnegie-Illinois Alloy Steels.

William E. Corrigan, assistant vice-president, has been elected vice-president of the **American Locomotive Company, Railway Steel Spring Division,** with headquarters at New York. Mr. Corrigan entered the service of the American Locomotive Company in 1909, and is a graduate of its four-year course in locomotive construction which the company conducts in its engineering department at Schenectady, N. Y. From May, 1913, he served in various capacities in the drawing office at Schenectady until 1915, when he was transferred to the Cooke plant, Paterson, N. J., and was engaged on elevation work and general calculating, remaining in that service until November, 1917, when he entered the United States Army, where he served consecutively as second lieutenant, first lieutenant and captain in the artillery ordnance branch, field service, in charge of plant production at several gun carriage and ammunition plants. Following the armistice, he served as secretary and then ordnance district chief and chairman of the claims board in charge of the settlement of claims arising out of the cancellation of war contracts between the government and various manufacturers. He re-entered the employ of the American Locomotive Company in 1920, serving for two years in the sales department at New York. He was then transferred to Chicago as salesman for Alco accessories in the middle western territory. In 1923 he was appointed general sales representative of the company on the Pacific Coast with the title of district sales manager and in 1930 he was transferred to Cleveland, retaining the same title, remaining in that position until January, 1935, when he was appointed assistant vice-president of the American Locomotive Company, Railway Steel Spring Division, of which he now becomes vice-president.

William E. Corrigan

TRADE PUBLICATION

IMPROVED RAILWAY EQUIPMENT.—Under the title "Research and Improved Equipment" the Pullman-Standard Car Manufacturing Company, Chicago, has recently issued an attractive 36-page illustrated booklet showing recent contributions of this company to the railroad and transit industries. Special high-speed light-weight trains, such as the Union Pacific streamliners and the Illinois Central Green Diamond, are described, also the light-weight alloy-steel coaches for two eastern railroads, an experimental aluminum coach, the Pullman two-car articulated unit built of high tensile steel and recently placed in trial service, etc. The advantages of light-weight freight equipment also are emphasized in the booklet which contains illustrations and brief descriptive data covering the Chicago Great Western all-welded hopper car and experimental light-weight box and refrigerator cars recently designed and built by Pullman-Standard. The latter part of the booklet is devoted to electric railway and bus equipment recently developed by this company.

Financial

ALABAMA, TENNESSEE & NORTHERN.—*Trustee's Certificates.* — The Interstate Commerce Commission has authorized the trustee of this road to issue not exceeding $30,000 of trustee's certificates of indebtedness to be sold at par, the proceeds to be used to purchase two gasoline-electric rail motor cars. Arrangements have been made for the sale of the certificates at par to the Merchants National Bank of Mobile, Mobile, Ala.

CHICAGO & NORTH WESTERN.—*Reorganization Plan.*—A hearing on the proposed reorganization plan for this company was begun before Examiners Boyden and Walsh of the Interstate Commerce Commission on September 9 and was adjourned without date on September 12.

GAINESVILLE MIDLAND.—*Acquisition.*—The Gainesville Midland Railroad has applied to the Interstate Commerce Commission for a certificate authorizing it to acquire and operate the property of the Gainesville Midland Railway and for authority to issue 4,140 shares of no-par stock in connection with the acquisition.

LEHIGH & NEW ENGLAND.—*Equipment Trust Certificates.*—The Interstate Commerce Commission has authorized this road to assume obligation and liability in respect of not exceeding $410,000 of equipment trust certificates, series J, to be issued by the Pennsylvania Company for Insurances on Lives & Granting Annuities as trustee, and sold at not less than 103.035 and accrued dividends.

NEW YORK, NEW HAVEN & HARTFORD.—*Equipment Trust Certificates.*—Trustees of this road have awarded to a banking group headed by Whiting, Weeks & Knowles, Inc., an issue of $3,075,000 of 3 per cent equipment trust certificates, due $205,000 each September 1, 1937, to 1951, inclusive. The banking group, which purchased the issue for 100.273, is offering the certificates at prices to yield from 0.75 per cent for the one-year maturity to 3.25 per cent for the 15-year maturity.

NORFOLK & SOUTHERN.—*Abandonment.*—The receivers have applied to the Interstate Commerce Commission for authority to abandon branch lines between Mackeys, N. C., and Bishop's Crossing, 23.2 miles, and between Euclid, Va., and Minden, 22.3 miles.

SPOKANE INTERNATIONAL.—*Reorganization Plan.*—This company has filed with the Interstate Commerce Commission a plan of reorganization proposing to reduce the annual fixed charges from $237,200 to $47,440.

Dividends Declared

Beech Creek.—50c, payable October 1 to holders of record September 15.

Joliet & Chicago.—Guaranteed Common, $1.75, quarterly, payable October 5 to holders of record September 23.

Mahoning Coal R. R.—$6.25, quarterly, payable November 2 to holders of record October 15.

Providence & Worcester.—$2.50, quarterly,

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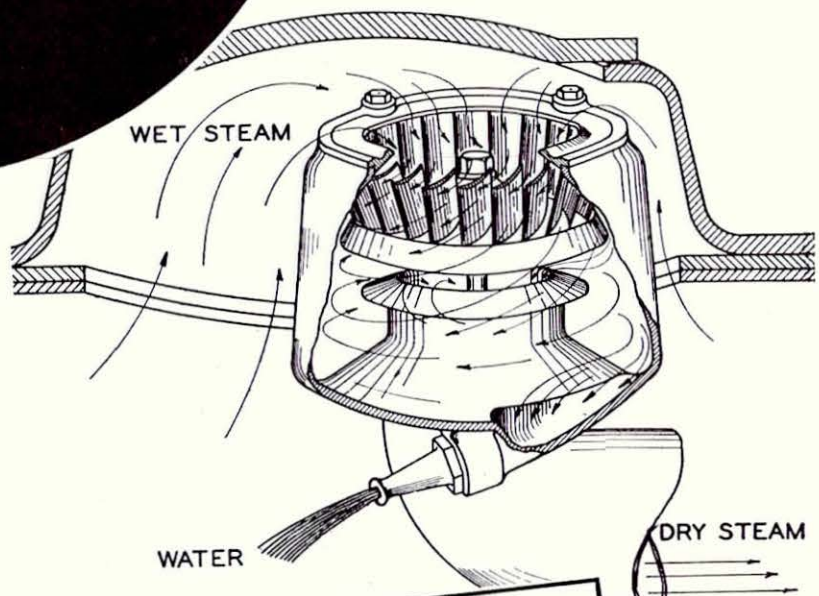
The *Elesco* Tangential Steam Dryer



Write for your copy of descriptive bulletin

ADVANTAGES

1—Separates Water from the Steam

2—Removes Scum and Solids from the Steam, Reducing Wear of Valves and Cylinders

3—Prevents Scale Deposits in Superheater and Throttle

4—Discharges Water Back into Boiler, Saving Water and Fuel

5—Insures Maximum Superheat

6—Easy to Install

7—Has No Moving Parts

8—Low in First Cost

9—Low in Maintenance Cost

• • •

98% Efficient Under Normal Operating Conditions

THE
SUPERHEATER
COMPANY

Representative of American Throttle Company, Inc.

60 East 42nd Street, New York

Peoples Gas Bldg., Chicago

Canada: The Superheater Company, Limited, Montreal

A-1089

ELESCO

payable October 3 to holders of record September 9.

St. Joseph, South Bend & Southern.—87½c; 5 Per Cent Preferred, both payable September 21 to holders of record September 10.

Southern Railway.—Mobile & Ohio Stock Certificates.—$2.00, payable October 1 to holders of record September 15.

Virginian.—6 Per Cent Preferred, $1.50, quarterly, payable November 2 to holders of record October 15.

Average Prices of Stocks and of Bonds

	Sept. 15	Last week	Last year
Average price of 20 representative railway stocks..	55.09	55.76	36.96
Average price of 20 representative railway bonds..	83.20	82.45	74.23

Construction

MINNEAPOLIS, ST. PAUL & SAULT STE. MARIE.—A contract has been awarded to Fairbanks, Morse & Company, Chicago, for the design and construction of a locomotive coaling station for installation at Mahnomen, Minn.

NEW YORK CENTRAL.—The New York Public Service Commission has approved the plans, specifications and an estimated cost of $155,000, exclusive of land and property damages, for the elimination of the Weedsport road crossing of this road in the town of Brutus, N. Y.

NEW YORK CENTRAL.—The low bid of the Cold Spring Construction Company, Inc., Akron, N. Y., of $103,150 for the elimination of this road's grade crossing on the Alden-Crittenden county road in the town of Alden, N. Y., has been approved by the New York Public Service Commission. The commission has directed that the contract be let and the work started as soon as possible. See item in *Railway Age*, August 1, page 194.

NEW YORK, NEW HAVEN & HARTFORD.—This company has placed an order with the Ross and White Company, Chicago, for steam sand dryers for drying all sand for the Cedar Hill terminal at New Haven, Conn.

NEW YORK, NEW HAVEN & HARTFORD.—A contract has been given to the Phoenix Bridge Company, New York, for the steel and to the O. W. Miller Company, Springfield, Mass., for masonry, to replace two northerly spans of bridge No. 7.27 over the Connecticut river at East Deerfield, Mass. The estimated cost of the work is $75,000.

PENNSYLVANIA.—This company and the Pittsburgh, Cincinnati, Chicago & St. Louis have applied to the Interstate Commerce Commission for authority to construct an extension from a point near Tyllerdale, Pa., to Hackney, 17.4 miles.

WABASH.—This company has placed an order with the Ross and White Company, Chicago, for an air compressor and additional sand handling facilities, to be added to the Burlington Junction, Mo., coaling plant, now under construction.

Railway Officers

EXECUTIVE

George A. Lamb, chief clerk to the vice-president in charge of traffic of the Erie, at Cleveland, Ohio, has had his title changed to assistant to the vice-president.

OPERATING

H. A. Benton, assistant general manager of the Seaboard Air Line, with headquarters at Norfolk, Va., has been appointed general manager for the receivers, having jurisdiction over all departments heretofore reporting to **E. C. Bagwell,** chief operating officer, deceased.

J. G. Schaefer, superintendent of the St. Louis division of the Pennsylvania, with headquarters at Terre Haute, Ind., has been appointed vice-president of the St. Louis National Stockyards Company, National City, Ill., and of the East St. Louis Junction Railway.

TRAFFIC

Bernard F. Conway has been appointed division freight agent of the Erie, with headquarters at Elmira, N. Y., succeeding **A. W. Michelbach,** who has retired because of ill health after 51 years of service.

E. M. Kain, who retired as assistant general freight agent of the Erie, with headquarters at Buffalo, N. Y., on September 1, has been appointed special representative, traffic department, with the same headquarters.

L. F. Binkley has been appointed general agent, freight and passenger departments, of the Missouri Pacific Lines, with headquarters at Sioux City, Ia., to succeed **J. D. Gowin,** who has been assigned to other duties.

J. R. Downey, traveling agent for the Minneapolis & St. Louis at Detroit, Mich., has been promoted to general agent, with the same headquarters, to succeed **O. M. Sandahl,** who has been transferred to Boston, Mass., to fill a newly-created position.

H. M. Boykin, assistant general freight agent of the Seaboard Air Line, with headquarters at Richmond, Va., has retired from active duty after 44 years of service with the company. **C. C. Cosby,** commercial agent, has been appointed assistant general freight agent at Richmond to succeed Mr. Boykin. The position of commercial agent formerly held by Mr. Cosby has been abolished. **W. J. Hock** has been appointed district freight agent, with headquarters at Richmond.

E. Kancher, division freight and passenger agent for the Panhandle & Santa Fe, with headquarters at Lubbock, Tex., has been transferred in the same position to Amarillo, Tex., to succeed **W. E. Goodloe,** who has been promoted. **R. H. Forbes,** division freight and passenger agent at San Angelo, Tex., has been transferred to Lubbock, Tex., to replace Mr. Kancher and **E. A. Tusha** will replace Mr. Forbes as division freight and passenger agent at San Angelo.

Effective October 1, **G. Bruce Burpee,** district passenger agent of the Canadian Pacific, with headquarters in Tornoto, Ont., has been appointed assistant general passenger agent at Montreal. **C. B. Andrews,** district passenger agent at St. John, N. B., has been transferred in the same capacity to Toronto to replace Mr. Burpee. **H. C. James,** general agent, with headquarters at Atlanta, Ga., will succeed Mr. Andrews as district passenger agent at St. John. **W. A. Shackelford,** general agent at Pittsburgh, Pa., has been transferred to Atlanta to replace Mr. James. The Pittsburgh agency will be placed under **R. F. Lyman,** city passenger agent.

ENGINEERING AND SIGNALING

D. W. Fuller, who has been promoted to signal engineer, Eastern lines, of the Atchison, Topeka & Santa Fe, at Topeka, Kan., was born on August 12, 1886, at Michigan Valley, Kan. After a public school education at Topeka, he worked as an electrician and then as a foreman for the Bell Telephone Company. He began his railroad career on November 15, 1906,

D. W. Fuller

when he entered the employ of the Santa Fe as a signal helper on a construction gang at Canyoncito, N. Mex. From the latter date until July 16, 1920, he served the Santa Fe in various positions on signal maintenance, construction work, inspection of illuminating oils and lamps and as draftsman and chief draftsman in the office of the signal engineer, eastern lines. After holding these positions he was promoted to assistant to the signal engineer. On February 15, 1925, he was promoted to assistant signal engineer, eastern lines, which position he has held until his recent promotion.

J. A. Parkinson, who has been appointed assistant signal engineer, eastern lines, with headquarters at Topeka, to suc-

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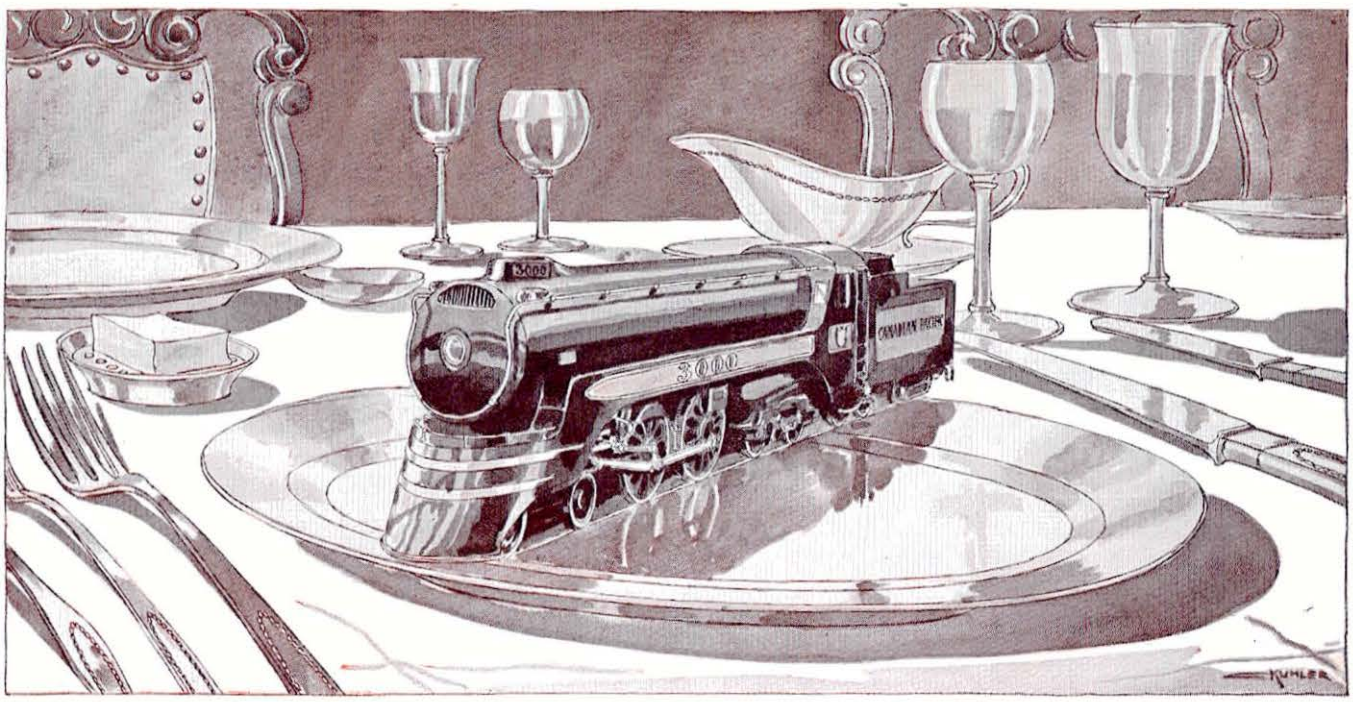


FOOD FOR THOUGHT

THE Canadian Pacific Railway is the largest travel organization in the world. They have been watching, studying, and thoroughly analyzing all the developments of late in ultra high speed service. • • • It, therefore, is significant that when the officers of this organization decided to install this service on their own line they unhesitatingly specified a steam power unit.

AMERICAN LOCOMOTIVE COMPANY

ALCO

30 CHURCH STREET · NEW YORK · N·Y·

ceed Mr. Fuller, was born on April 22, 1900, at Topeka. After working for various companies at Topeka, he entered the employ of the Santa Fe as a laborer in the signal department in January, 1919. For three years he was employed on construction gangs, and in 1922 became a draftsman in the eastern lines office. In the same year he resigned to attend Kansas university, he returned to the signal department in the system office and served intermittently until graduation and continuously thereafter. In May, 1926, he was promoted to chief draftsman in the office of the signal engineer of the system, which position he has held until his recent promotion.

MECHANICAL

T. W. Carr, master car builder on the Pittsburgh & Lake Erie, with headquarters at McKees Rocks, Pa., has been appointed superintendent of rolling stock, with the same headquarters, to succeed **S. Lynn,** deceased.

T. M. Kirkby has been appointed superintendent motive power and equipment of the Green Bay & Western, with headquarters at Green Bay, Wis., succeeding **E. Becker,** who has been appointed mechanical inspector.

MOTOR TRANSPORT

Harry G. Brandt, who has been appointed assistant general manager of the department of highway motor transport of the Atchison, Topeka & Santa Fe, has been connected with this company for 30 years. He first entered the service of the Santa Fe on November 6, 1906, as a stenographer at Dodge City, Kan., later serving as private secretary to the superintendent and general superintendent at La Junta, Colo., and in various clerical positions in the general superintendent's office at Amarillo, Tex., and Newton, Kan. In October, 1912,

Harry G. Brandt

he was promoted to chief clerk in the office of the general superintendent at Amarillo, serving in this capacity and as chief clerk to the assistant general manager until July 1, 1926. On that date he was promoted to trainmaster of the Plains division, with headquarters at Waynoka, Okla., being transferred to the Panhandle division, with headquarters at Wellington, Kan., on July 5, 1928. He was holding the latter position at the time of his appointment as assistant general manager of the department of highway motor transport, with headquarters at Chicago.

OBITUARY

Eugene C. Bagwell, chief operating officer of the Seaboard Air Line, whose death on September 6 was noted in the *Railway Age* of September 12, was born on October 3, 1884, at Raleigh, N. C., and was graduated from the North Carolina State College in 1904. He entered the service of the Seaboard Air Line in August of the same year, as construction engineer, serving in that capacity until March, 1908, when he was appointed superintendent of the Charlotte Harbor & Northern (part of the Seaboard Air Line). From September, 1909, to April, 1910, he was resident engineer, and on the latter date he became principal assistant engineer. Mr. Bagwell served in this capacity until April, 1914, when he was made assistant to the president. Three years later he became division superintendent, remaining in this position until February, 1925, at which time he was appointed general superintendent. Mr. Bagwell was promoted to the position of operating assistant to the vice-president in February, 1928, and served in that capacity until May, 1928,

E. C. Bagwell

when he became general manager. He became chief operating officer in the latter part of 1934.

Legal Rebates

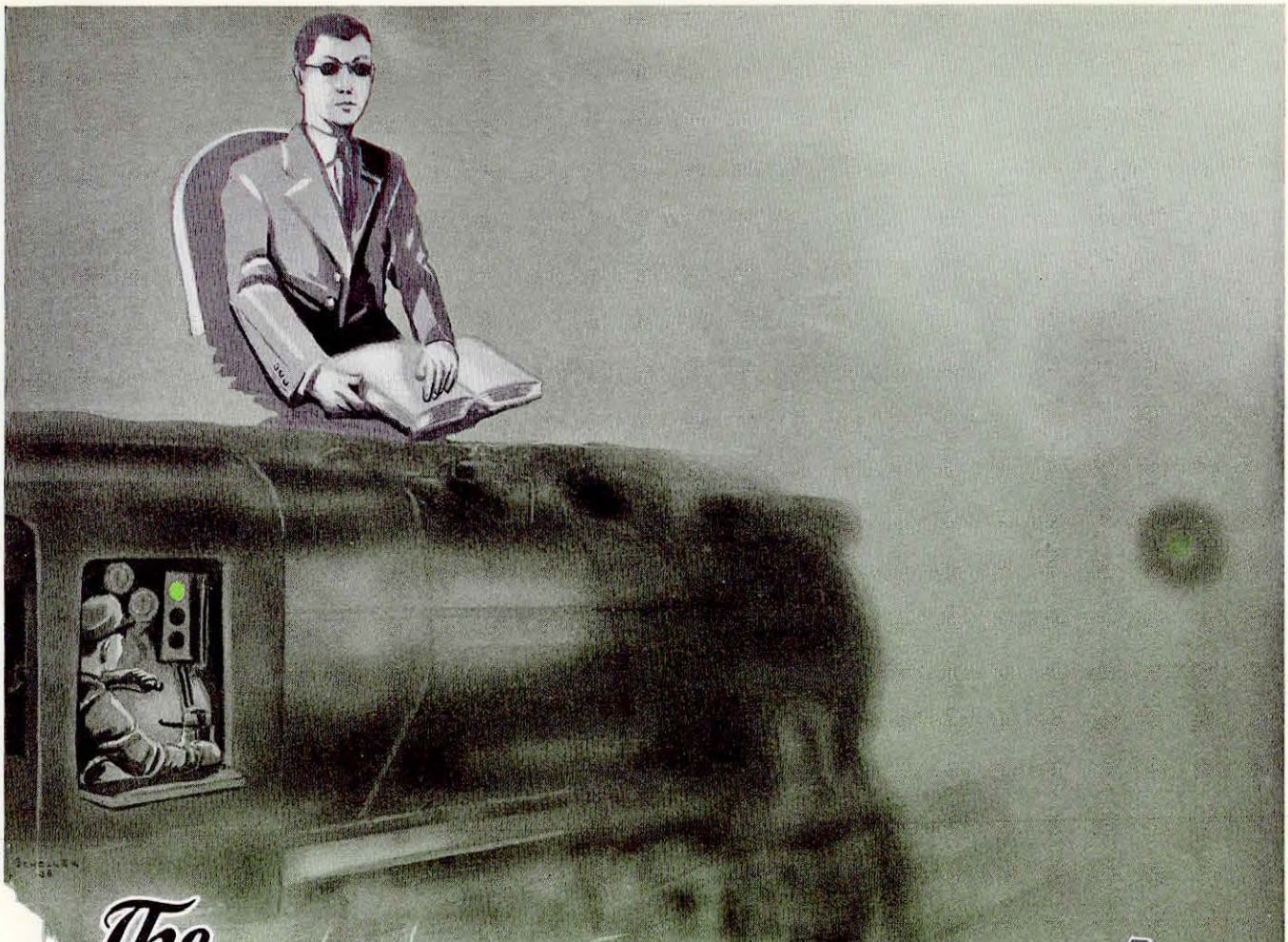
The so-called reparation clause is perhaps the most vicious provision of the interstate commerce act. Any individual may complain to the regulatory body that in his opinion the rate being charged on certain merchandise is unjust and otherwise unlawful. After reviewing such evidence as may be offered and submitting the rate to a series of mathematical tests that have grown up under regulation, the Interstate Commerce Commission may summarily order a railway to make a substantial reduction in the charge. So far so good, but the law goes further. At the discretion of the commissioners the new and reduced basis may be made retroactive for a period of two years prior to the filing of the complaint. The railway is ordered to refund the difference between the new and old rates as a penalty for alleged gouging and it is accepted by the gougee as reparation for an imaginary injury.

—*From the Chicago Tribune*

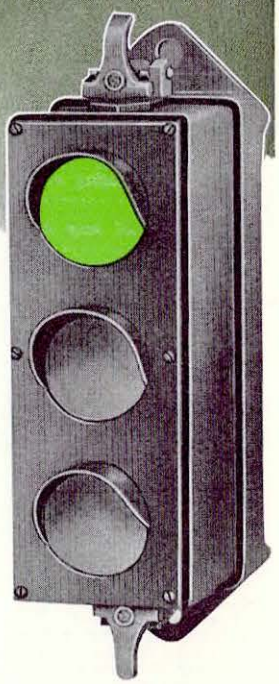
Gross injustice is inevitable because the railway seldom knows that its rate is not acceptable until the complaint is filed. Its agents cannot be conversant with the details of its patrons' business. Worse still, it is frequently true that the complainant is unaware of inconsistencies in the railway tariffs until solicited by some rate expert who is schooled in the ingenious devices of the reparation racket. Worst of all, a very substantial number of the complaints have no merit whatever. The unlawfulness of the rate is proved by logarithms and slide rule methods of rate construction. A study of the decisions of the Interstate Commerce Commission will bring the conviction that the great bulk of proceedings have reparation payments as their main objective rather than the promotion of healthy business conditions for the future.

In framing the motor carrier act to regulate highway freighting, Congress apparently balked at the extension of the reparation evil. While the commission may order a truck line to reduce its rates it cannot make the new standards retroactive. As a result, this most offensive phase of the disparity between the regulation of truck and railway operators still persists. The next Congress should frame a bill so to amend the interstate commerce act as to delete the reparation section, a program which the commission itself has frequently advocated. Reparation levies are the underlying cause of frozen rate structures because the carriers must always be on the defensive. They dare not offer rates which may be absolutely necessary for proper distribution of traffic, because a breach in their defense might render them liable to unjust claims on a vast volume of traffic that has been consumed and forgotten by everybody except the freight rate racketeer.

Table of Operating Revenues and Expenses appears on next left-hand page



The Blind Can Read!



JUST as the Braille system substitutes finger tips for eyes in enabling the blind to read, so do "Union" Coded Continuous Cab Signals lift a heavy veil of fog which hides wayside signal indications from the view of the enginemen during certain unfavorable weather periods. The signal is brought into the locomotive cab where nothing can obstruct its view. » » » » » » » » » » » »

Our nearest office will explain how this fact accelerates traffic, increases safety and promotes economy.

Union Switch & Signal Co.
SWISSVALE, PA.

NEW YORK
MONTREAL
CHICAGO
ST. LOUIS
SAN FRANCISCO

1123

Operating Revenues and Operating Expenses of Class I Steam Railways in the United States

Compiled From 140 Monthly Reports of Revenues and Expenses Representing 144 Class I Steam Railways

FOR THE MONTH OF JULY, 1936 AND 1935

Item	United States		Eastern District		Southern District		Western District	
	1936	1935	1936	1935	1936	1935	1936	1935
Average number of miles operated	236,671	237,893	58,544	58,959	44,889	45,243	133,238	133,691
Revenues:								
Freight	$283,943,620	$221,100,908	$116,871,360	$91,191,326	$52,750,888	$41,600,351	$114,321,372	$88,309,231
Passenger	39,187,173	31,597,304	21,138,111	17,866,252	4,536,007	3,405,525	13,513,055	10,325,527
Mail	7,507,462	7,339,865	2,890,649	2,790,900	1,325,390	1,345,659	3,291,423	3,203,306
Express	3,407,366	2,561,965	1,287,865	1,025,205	584,133	401,254	1,535,368	1,135,506
All other transportation	7,499,180	6,140,093	3,913,854	3,299,814	692,097	550,163	2,893,229	2,290,116
Incidental	7,509,139	5,909,863	3,711,785	2,982,828	851,588	715,519	2,945,766	2,211,516
Joint facility—Cr.	941,991	848,374	277,577	239,005	237,177	215,227	427,237	394,142
Joint facility—Dr.	251,968	190,818	53,580	45,279	24,534	19,095	173,854	126,444
Railway operating revenues	349,743,963	275,307,554	150,037,621	119,350,051	60,952,746	48,214,603	138,753,596	107,742,900
Expenses:								
Maintenance of way and structures	42,464,048	38,051,067	15,540,739	14,253,933	7,112,931	6,176,474	19,810,378	17,620,660
Maintenance of equipment	65,514,176	55,828,044	28,942,855	23,696,516	12,045,385	10,578,713	24,525,936	21,552,815
Traffic	8,842,464	8,165,026	3,324,785	3,104,128	1,601,506	1,498,938	3,916,173	3,561,960
Transportation	115,702,380	102,069,242	52,034,536	46,392,027	18,326,209	16,629,096	45,341,635	39,048,119
Miscellaneous operations	3,282,486	2,471,416	1,368,727	1,049,752	289,164	245,531	1,624,595	1,176,133
General	13,168,895	11,800,474	5,780,977	5,353,287	2,221,301	2,026,535	5,166,617	4,420,652
Transportation for investment—Cr.	608,597	362,818	52,332	75,719	101,594	27,225	454,671	259,874
Railway operating expenses	248,365,852	218,022,451	106,940,287	93,773,924	41,494,902	37,128,062	99,930,663	87,120,465
Net revenue from railway operations	101,378,111	57,285,103	43,097,334	25,576,127	19,457,844	11,086,541	38,822,933	20,622,435
Railway tax accruals	27,912,486	19,894,315	12,140,243	8,256,556	5,488,179	3,903,159	10,284,064	7,734,600
Railway operating income	73,465,625	37,390,788	30,957,091	17,319,571	13,969,665	7,183,382	28,538,869	12,887,835
Equipment rents—Dr. balance	8,328,723	7,483,251	3,643,538	3,534,665	283,968	238,829	4,401,217	3,709,757
Joint facility rent—Dr. balance	3,363,138	2,988,194	1,849,452	1,624,542	470,986	375,156	1,042,700	988,496
Net railway operating income	* 61,773,764	† 26,919,343	25,464,101	12,160,364	13,214,711	6,569,397	23,094,952	8,189,582
Ratio of expenses to revenues (per cent)	71.01	79.19	71.28	78.57	68.08	77.01	72.02	80.86
Depreciation included in operating expenses	16,165,056	16,406,353	7,019,870	7,189,438	3,179,712	3,210,513	5,965,474	6,006,402
Total maintenance before depreciation	91,813,168	77,472,758	37,463,724	30,761,011	15,978,604	13,544,674	38,370,840	33,167,073
Net railway operating income before depreciation	77,938,820	43,325,696	32,483,971	19,349,802	16,394,423	9,779,910	29,060,426	14,195,984

FOR SEVEN MONTHS ENDED WITH JULY, 1936 AND 1935

Average number of miles operated	236,974	238,164	58,634	59,004	44,936	45,254	133,404	133,906
Revenues:								
Freight	$1,809,660,006	$1,541,441,210	$781,944,163	$677,818,891	$357,912,829	$307,968,142	$669,803,014	$555,654,177
Passenger	231,555,784	202,377,793	130,590,510	118,191,987	32,183,791	27,265,258	68,781,483	56,920,548
Mail	53,490,835	52,416,544	20,528,661	20,098,855	9,588,469	9,356,182	23,373,705	22,961,507
Express	32,131,002	29,919,068	12,602,471	11,704,451	7,140,689	7,147,388	12,387,842	11,067,229
All other transportation	47,924,277	42,222,646	25,238,377	22,865,977	4,755,915	4,206,083	17,929,985	15,150,586
Incidental	43,230,265	38,290,657	23,006,540	20,321,851	6,267,271	5,838,325	13,956,454	12,130,481
Joint facility—Cr.	6,340,033	5,579,369	1,907,551	1,725,976	1,429,841	1,300,900	3,002,641	2,552,493
Joint facility—Dr.	1,659,372	1,403,798	355,134	389,081	151,366	121,359	1,152,872	893,358
Railway operating revenues	2,222,672,830	1,910,843,489	995,463,139	872,338,907	419,127,439	362,960,919	808,082,252	675,543,663
Expenses:								
Maintenance of way and structures	259,190,596	221,641,199	99,775,953	84,714,212	46,713,930	42,992,586	112,700,713	93,934,401
Maintenance of equipment	446,090,317	389,449,783	201,503,241	173,163,240	81,312,784	74,092,633	163,274,292	142,193,910
Traffic	57,955,064	55,160,395	21,409,247	20,658,487	11,232,936	10,572,834	25,312,881	23,929,074
Transportation	797,313,920	714,450,540	367,248,866	331,481,675	132,172,719	120,824,407	297,892,335	262,144,458
Miscellaneous operations	19,925,315	17,169,517	9,067,316	7,955,876	2,553,282	2,214,163	8,304,717	6,999,478
General	91,619,365	81,849,176	40,313,976	38,084,263	15,538,050	14,555,300	35,767,339	29,209,613
Transportation for investment—Cr.	2,347,295	1,752,307	234,470	394,807	338,549	229,877	1,774,276	1,127,623
Railway operating expenses	1,669,747,282	1,477,968,303	739,084,129	655,662,946	289,185,152	265,022,046	641,478,001	557,283,311
Net revenue from railway operations	552,925,548	432,875,186	256,379,010	216,675,961	129,942,287	97,938,873	166,604,251	118,260,352
Railway tax accruals	176,579,272	141,206,979	74,037,929	58,006,141	36,333,829	29,422,283	66,207,514	53,778,555
Railway operating income	376,346,276	291,668,207	182,341,081	158,669,820	93,608,458	68,516,590	100,396,737	64,481,797
Equipment rents—Dr. balance	53,665,478	49,090,497	25,070,159	23,863,081	3,105,226	3,074,543	25,490,093	22,152,873
Joint facility rent—Dr. balance	22,661,742	20,881,912	12,413,869	11,817,607	2,771,387	2,210,904	7,476,486	6,853,401
Net railway operating income	‡ 300,019,056	§ 221,695,798	144,857,053	122,989,132	87,731,845	63,231,143	67,430,158	35,475,523
Ratio of expenses to revenues (per cent)	75.12	77.35	74.25	75.16	69.00	73.02	79.38	82.49
Depreciation included in operating expenses	112,945,326	113,935,796	49,139,552	49,603,044	22,324,519	22,262,799	41,481,255	42,069,953
Total maintenance before depreciation	592,335,587	497,155,186	252,139,642	208,274,408	105,702,195	94,822,420	234,493,750	194,058,358
Net railway operating income before depreciation	412,964,382	335,631,594	193,996,605	172,592,176	110,056,364	85,493,942	108,911,413	77,545,476

* Includes charges to Railway Tax Accruals in the total amount of $5,357,013, itemized as follows: $1,510,745 for taxes under the requirements of the Social Security Act of 1935, and $3,846,268 under the requirements of an Act approved August 29, 1935, levying an excise tax upon carriers and an income tax upon their employees, and for other purposes. (Public No. 400, 74th Congress.)

† Includes credits to General Expenses in the amount of $932,436 on account of reversal of charges previously made for liability under the Railroad Retirement Act of 1934.

‡ Includes charges to Railway Tax Accruals in the total amount of $29,732,148, itemized as follows: $10,124,808 for taxes under the requirements of the Social Security Act of 1935, and $19,607,340 under the requirements of an Act approved August 29, 1935, levying an excise tax upon carriers and an income tax upon their employees, and for other purposes. (Public No. 400, 74th Congress.)

§ Includes credits to General Expenses in the amount of $6,458,128 on account of reversal of charges previously made for liability under the Railroad Retirement Act of 1934.

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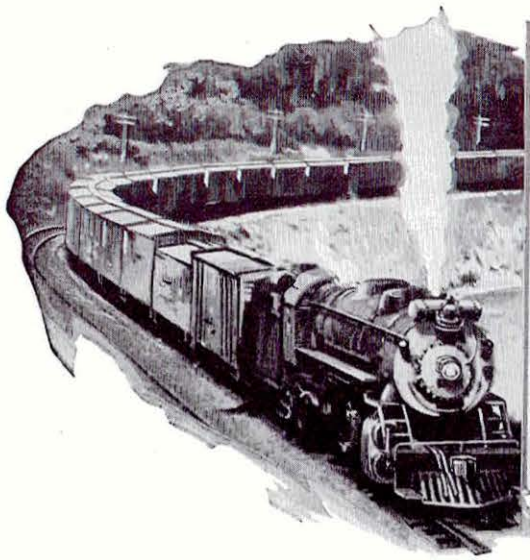

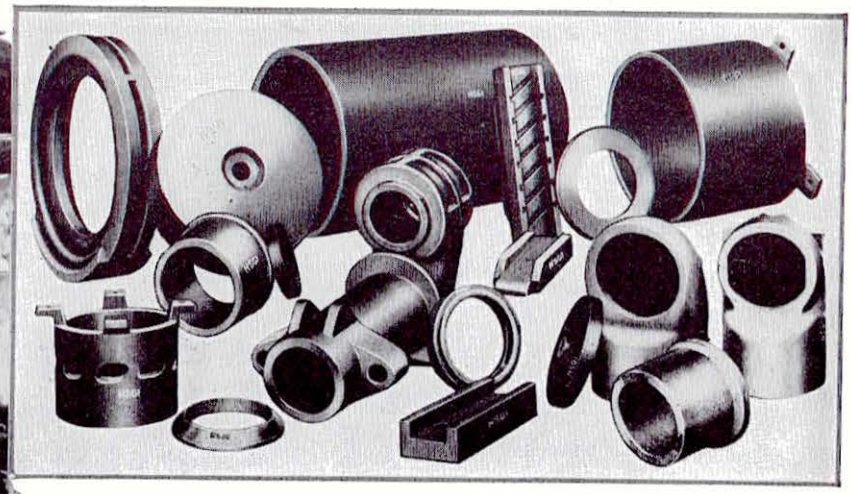

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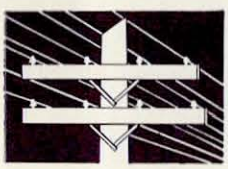

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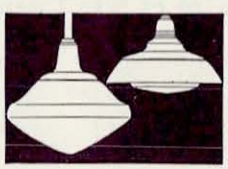
5 

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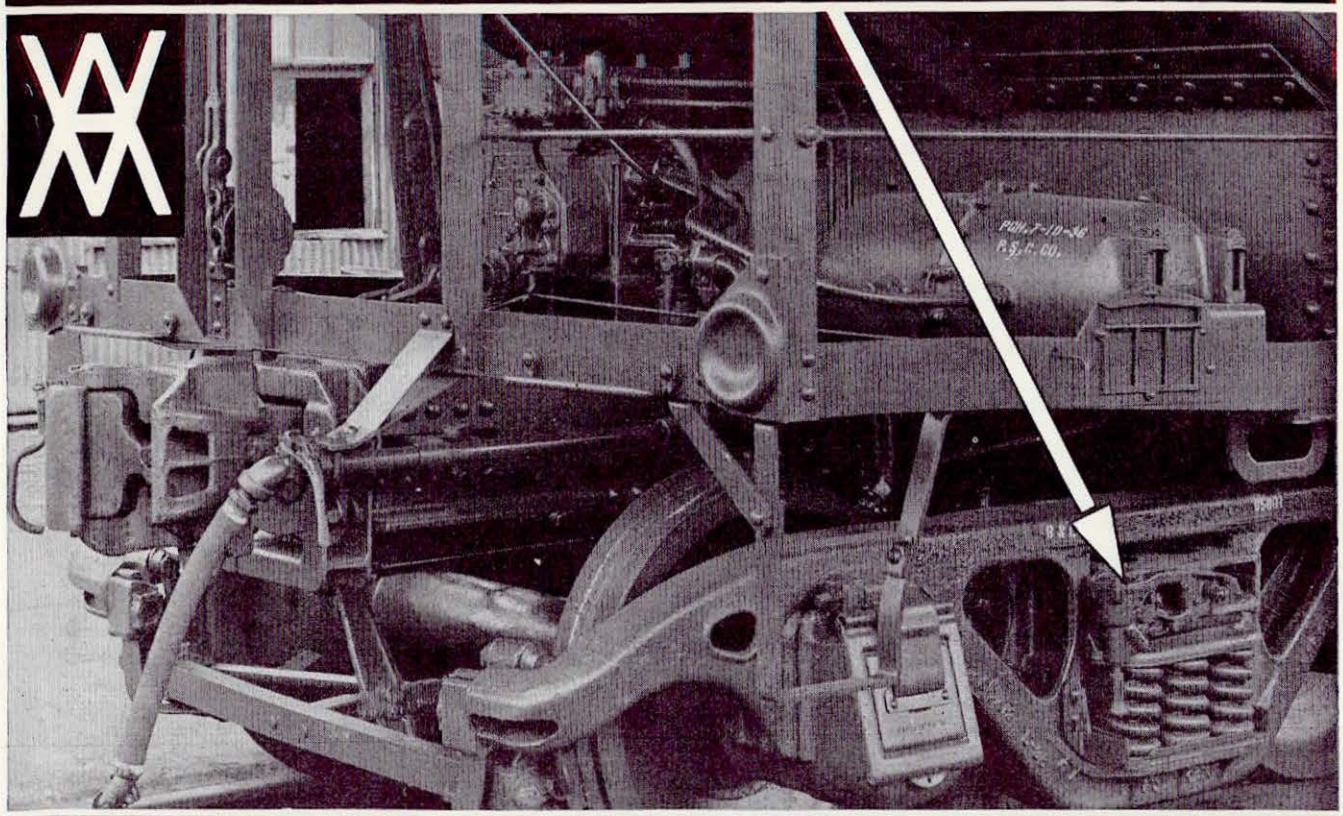

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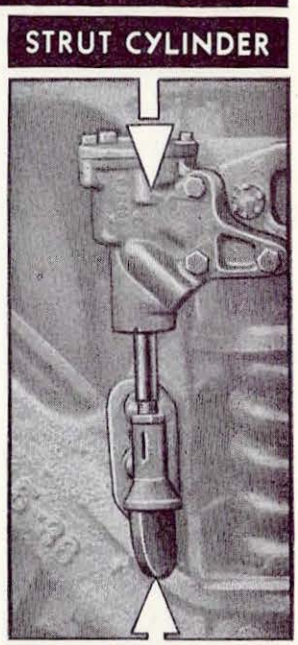

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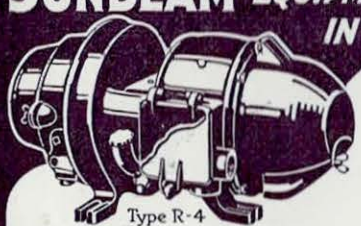

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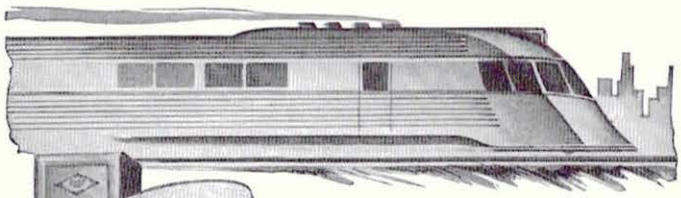

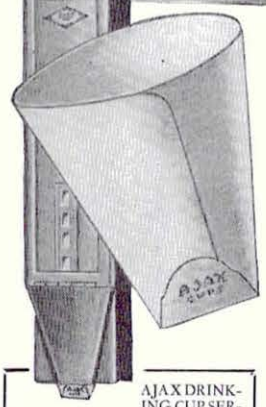

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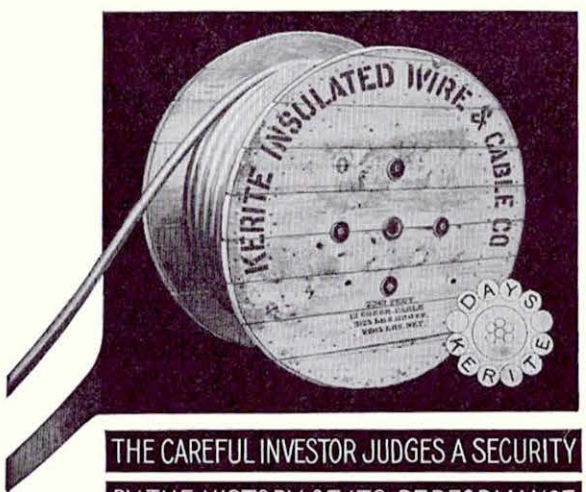

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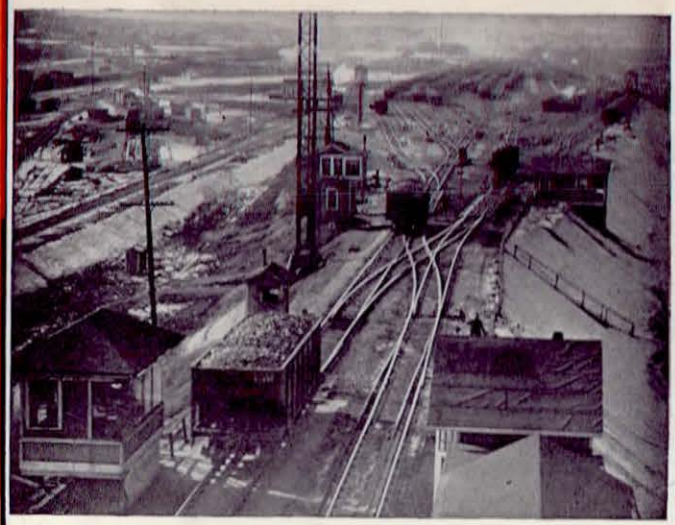

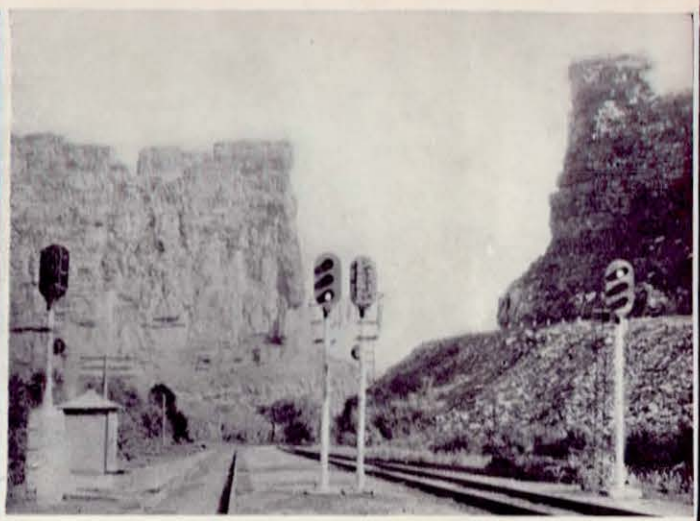

364 Installations Net 34.4% Annually

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Installations on which this average saving is based comprise automatic block signals, car retarders, centralized traffic control, automatic and manually operated interlockings, consolidation of interlocking plants, highway grade crossing protection, remote control, and train operation by signal indication.

★ ★ ★

Modern signal systems not only increase safety of operation and provide improved and expedited train service, but also immediately upon installation begin to pay dividends.

*From Chapter III, "Principles and Economic Phase of Signaling," as prepared by the A.A.R. Signal Section, and recently published additions to the Chapter.

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HISTORY IN THE MAKING

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